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Skeptical Inquirer

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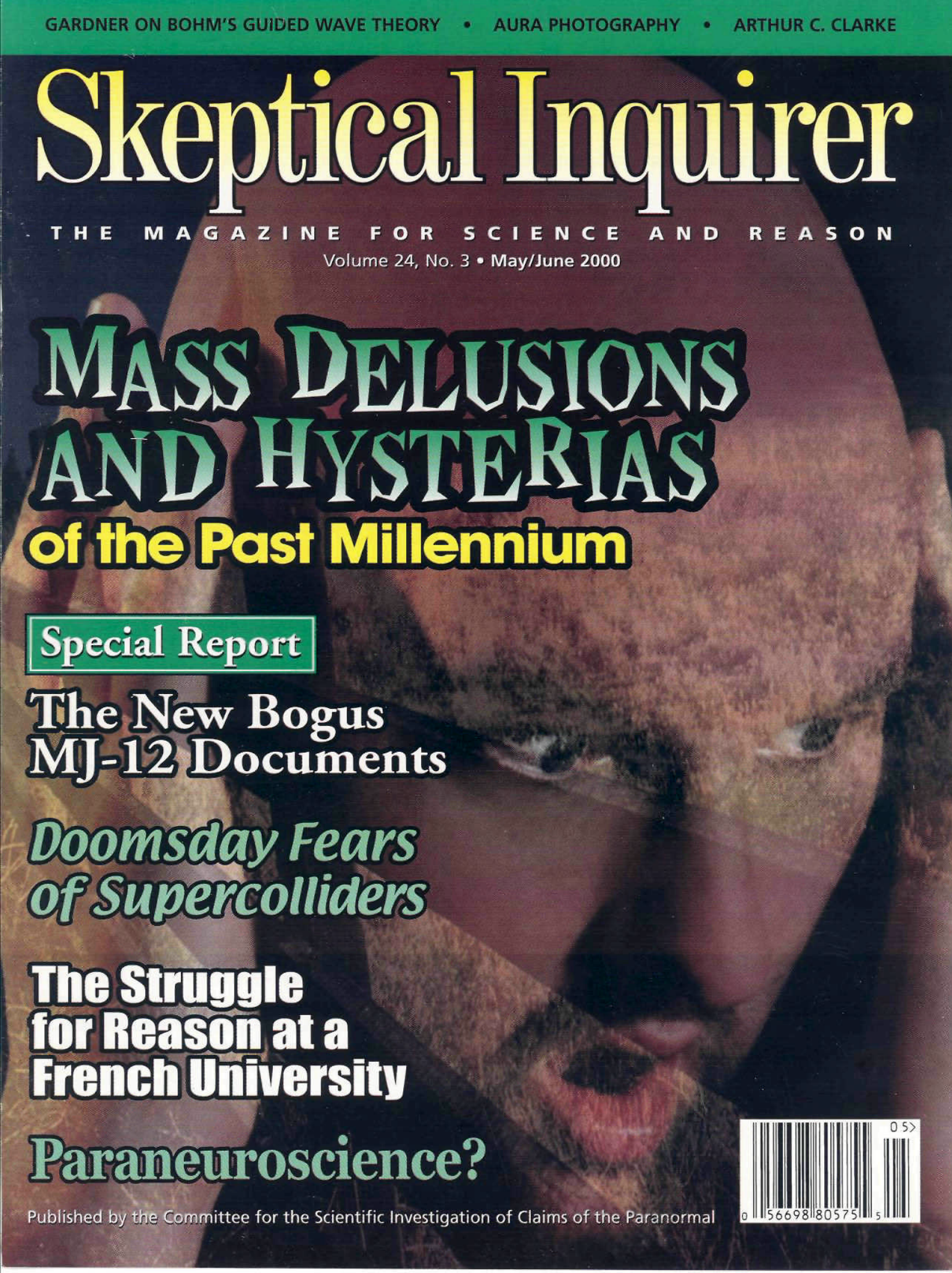

Mass Delusions and Hysterias of the Past Millennium

Special Report

The New Bogus MJ-12 Documents

Doomsday Fears of Supercolliders

The Struggle for Reason at a French University

Paraneuroscience?

Published by the Committee for the Scientific Investigation of Claims of the Paranormal

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The new crashed-saucer documents, like their 1987 predecessors, are riddled with flaws.

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Highlights from the Past Millennium

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This year, the Relativistic Heavy Ion Collider (RHIC) is poised to begin a program of cutting-edge nuclear science. Recently, alarmist journalism unnecessarily raised public fears about implausible doomsday scenarios associated with the machine.

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The Struggle for Reason at the University

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40 Paraneuroscience?

Psychology is the study of individual cognitive behavior and parapsychology is the study of psychic phenomena. Neuroscience is the study of the brain and is a discipline closely related to psychology—so why is there no paraneuroscience?

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Cover Photo by Gary Wiepert
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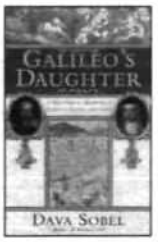


EDITOR'S NOTE

Human Folly Marches On . . . But So Does Science

What do meowing-and-biting nuns, the Salem witch trials, the Leeds message-on-hens-eggs end-of-world terror, the *New York Sun* life-on-the-Moon hoax, the Banda Island head-hunting rumor-panic, the Seattle windshield-pitting epidemic, the 1947 flying saucer wave, the West Bank psychogenic symptoms episode, and the Nigerian vanishing-genitalia fear have in common? They are all examples of collective delusions or mass hysterias that reached some degree of prominence at different times over the past millennium.

In this issue, sociologists Robert E. Bartholomew and Erich Goode survey some of the more colorful mass delusions and hysterias from the past thousand years of human folly. This is a rich field for sociologists, and Bartholomew and Goode study such episodes in detail. But here they just let the bare facts speak for themselves. People being what we are, one thing is clear. As the authors say: "The next one thousand years will yield a new batch of social delusions and hysterical outbreaks that will reflect the hopes and fears of future generations."

* * *

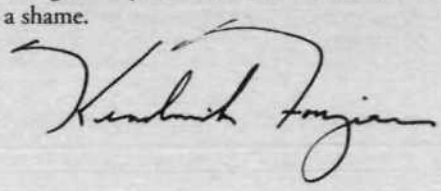
This issue contains three different easy-to-read tutorials on three exciting and fertile areas of science. Physicist Thomas D. Gutierrez clearly summarizes the experiments to begin any day now at the Relativistic Heavy Ion Collider at Brookhaven, on Long Island. This accelerator will collide two gold nuclei head-on at 99.995 percent of the speed of light, briefly creating, it is hoped, a quark-gluon plasma similar to what the universe consisted of a millionth of a second or so after the Big Bang. Martin Gardner provides one of the clearest expositions I have read about David Bohm's neglected "guided wave theory," which shows us a way to understand and explain some of the paradoxes of quantum mechanics. And neuroscientist Kyle Kirkland provides a fine overview of some of the new understanding in neuroscience, the study of the brain.

Kirkland does so in raising an interesting question: Why is their no fringe-science counterpart of neuroscience, why no *para*neuroscience? The reasons show why the understanding of brain function achieved through neuroscience has been so fruitful. The Gutierrez article also has a purpose special to SI—to show how scientists addressed public concerns about the experiments, concerns alleging apocalyptic possibilities raised in several misleading and sensational media reports (*the majority of media coverage was highly responsible*). *Gutierrez shows how the* real science negates these concerns, but also how the RHIC scientists took the public concerns seriously and addressed them straightforwardly. This may be a success story.

In the meantime, if, like me, you enjoy good, imaginative hard-science science fiction, I recommend physicist Gregory Benford's 1999 novel *Cosm,* which centers on experiments at RHIC much like those planned. In the course of it he portrays science as it really works better than most nonfiction works do.

* * *

Speaking of science fiction writers, I review in this issue Arthur C. Clarke's collected essays. Rereading his writings from the 1940s on about space flight, I was struck by an unstated poignancy: how quickly we got to the Moon, probably sooner than Clarke and fellow visionaries expected; yet how little we have done since. No manned missions have gone beyond Earth orbit since 1972. I understand the reasons, but still, it's a shame.



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Public Wants Evolution, Not Creationism, in Science Class, New National Poll Shows

The announcement below was issued March 10 by the People For the American Way Foundation in Washington. We also reproduce some of the key data from the study.—EDITOR*

Nearly three-quarters of a century after science teacher John Scopes was found guilty of breaking Tennessee law for teaching evolution, most Americans have a strong opinion about what *should* be taught in America's science classes. In a new nationwide poll on the subject, conducted by the polling firm headed by Daniel Yankelovich and commissioned by People For the American Way Foundation, 83 percent of Americans express the view that it's Darwin's theory of evolution, not creationism, that belongs in science class.

While the public dispute is most often portrayed as an "either/or" choice —evolution versus creation— most Americans don't see it that way, the poll shows. About 70 percent of Americans don't see any conflict at all between the two explanations for how life came to be. The majority of the public clearly does not buy the notion put forward by the creationists that you must choose between the Bible and evolution.

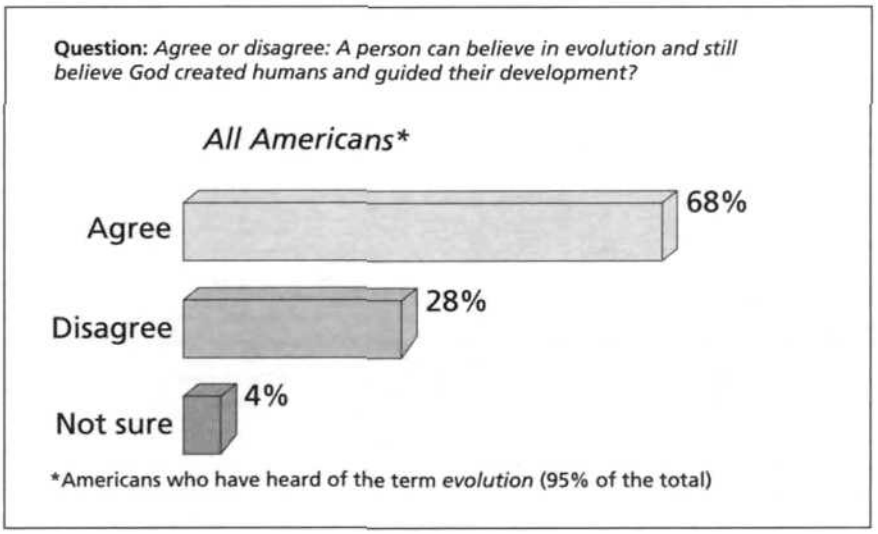
Most Americans see evolution as scientific theory and creation as a matter of belief, and believe that the two are not mutually exclusive. While they want schools to acknowledge that many people have religious beliefs concerning the beginning of life, they do not want evolution to be replaced by creationism, nor do they want the two taught side-by-side as equal but competing scientific theories.

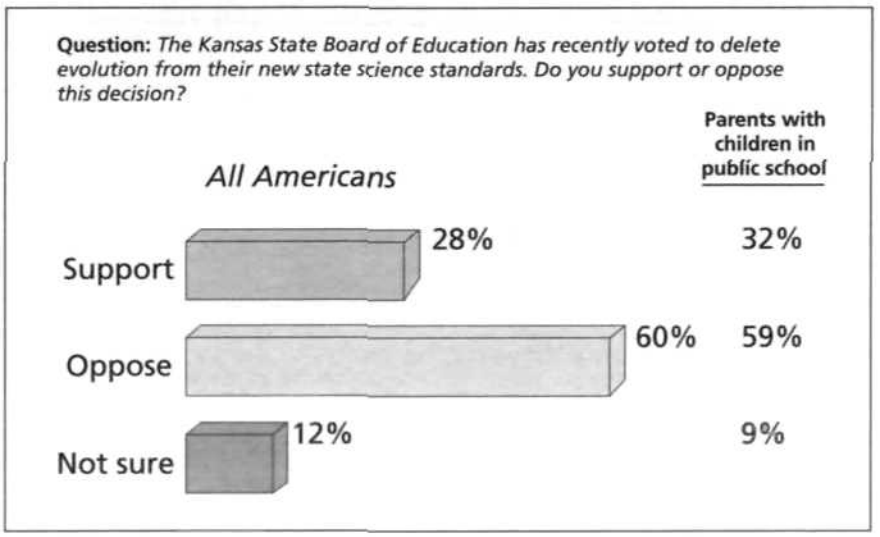
"To put it simply, this poll shows that most Americans believe that God created evolution," said Ralph G. Neas, President of People For the American Way Foundation (PFAWF), which commissioned the poll in the wake of public outcry over last year's decision by the Kansas Board of Education to drop evolution from its statewide science standards.

The public is clearly not supportive of attempts by a small, extreme minority to force their religious beliefs into science classrooms either as "Creation Science" (which almost half of Americans have never heard of) or by stripping the teaching of evolution from the curriculum. The poll shows that the majority of Americans (60 percent) reject the Kansas Board of Education's 1999 decision to delete evolution from its state science standards.

"One of the most remarkable things this poll shows us is that, with this kind of broad public support, there shouldn't be any controversy at all about teaching evolution," said Neas. "The fact that there *is* a debate shows us how effective a very small but very vocal group has been in imposing their views on our schools."

"The poll should also be a warning to public officials and schools," Neas continued. "If they cave in to pressure to eliminate evolution or to force creationism into the science classroom, they will be acting against the views and wishes of


Question: Agree or disagree: A person can believe in evolution and still believe God created humans and guided their development?
All Americans*
Agree
68%
Disagree
28%
Not sure
4%
*Americans who have heard of the term evolution (95% of the total)



most Americans."

The polling was carried out by DYG, Inc., the opinion research firm founded and still headed by Daniel Yankelovich and Madelyn Hochstein. PFAWF's purpose in commissioning the poll was to inform the public debate over the issue by letting the American people's views be known and understood.

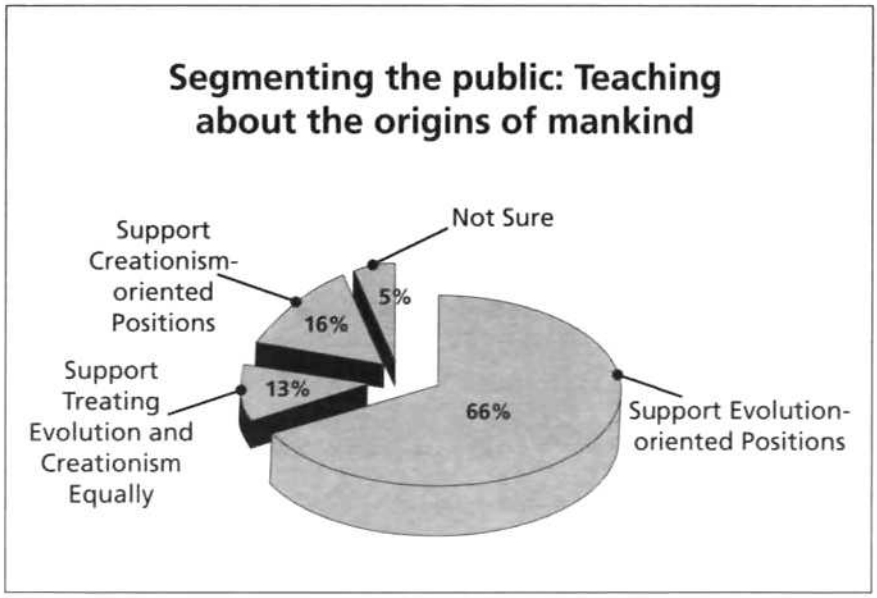
"In all the media debate over the Kansas Board's decision to drop evolution, the one missing ingredient was what the people thought," said Neas. "We conducted this poll to complete the picture."

Evolution versus creationism is a perennial hot topic, one that is sure to heat up in Kansas again with state education board elections on the horizon and half of the seats up for grabs. Recent disputes over a textbook disclaimer in Oklahoma and a charter school that wanted to teach creationism in Rochester, New York, are just a few recent examples of the perpetually simmering debate started when Charles Darwin published his revolutionary theory a century and a half ago.

When it comes to how schools should handle what has been portrayed as a conflict between evolution and creation, the public agrees on a number of basic principles, although they haven't formulated a detailed idea of precisely how schools can resolve the matter in practice. There is broad agreement that schools should acknowledge that some people have creationist beliefs and even teach about those beliefs—but not as science. There is also a strong consensus not only that schools should teach evolution, but that how they handle the subject along with creationist beliefs should be a matter of national policy, not just a local matter to be decided by each state or school district.

The poll results also suggest that, while the public is overwhelmingly supportive of teaching evolution, their knowledge is quite limited about the details of evolutionary theory, pointing to a need for greater efforts to inform and educate the public about evolution. At a March 10 news conference in Washington, People For the American Way Foundation announced that it has begun planning such a campaign to coincide with the 75th anniversary this year of the Scopes Trial.

**Evolution and Creationism in Public Education: An In-depth Reading of Public Opinion. Results of a Comprehensive, National Survey.* Prepared for People For the American Way Foundation, 2000 M Street NW, Suite 400, Washington, D.C. 20036. Web www.pfaw.org. Prepared by DYG, Inc., March 2000. A supplementary 24-page booklet was also issued by the People For the American Way Foundation: "Sabotaging Science: Creationist Strategy in the '90s."



Nostradamus 1999 Predictions Miss (Again)

According to several interpreters of the famed French prognosticator Nostradamus, the world should have seen cataclysmic wars last year. Among the not-so-prescient prophecy promoters:

- Henry C. Roberts, author of *The Complete Prophecies of Nostradamus*, claimed that between November 23 and December 21 the War of Wars would begin. He got this information from the quatrain

When a fish pond that was a meadow shall be mowed,
Sagittarius being in the ascendant,
Plague, Famine, Death by the military hand,
The century approaches renewal.

- Jean-Charles de Fontbrune, author of *Nostradamus: Countdown to Apocalypse*, also predicted a great war in 1999, but on the basis of a different verse:

Heads of Aries, Jupiter and Saturn
O Eternal God, What changes there shall be!
After an era his evil time returns,
Gaule and Italy, what commotion!

- Not to be outdone, Stewart Robb, author of *Nostradamus: Prophecies on World Events*, says that the War of Armageddon was to have occurred in 1999. He derives this from

In the year 1999 and seven months,
From the skies shall come an alarmingly powerful king,
To raise again the great King of the Jacquerie,
Before and after, Mars shall reign at will.

If you're a Nostradamus believer and the world you live in didn't end, take heart: Nostradamus still has another chance. According to V.J. Hewitt's interpretation (in his book *Nostradamus: The End of the Millennium*), man will land on Mars later this year.

—Benjamin Radford

Benjamin Radford is Managing Editor of the SKEPTICAL INQUIRER.

Mirages of Remote Viewing from Hawaii

The Hawaii Remote Viewers Guild (HRVG, http://www.hrvg.org) is a "skill-based association of people interested in the Research and Development of Remote Viewing." They are attempting to develop the techniques of remote viewing so that it can work reliably, as well as using their techniques to view objects of interest, such as UFOs and downed aircraft. But a test performed by the Triad Area Skeptics Club (TASC) indicates that they should first focus their efforts on verifying that their techniques work at all. (The 'Triad Area' refers to Winston-Salem, Greensboro, and High Point, North Carolina, and surrounding communities.)

Remote viewing is a method whereby viewers attempt to view a remote location or object (the "target") psychically. Typically they attempt to draw simplified sketches of the target. Similarities between the drawing and any part of the target or object near the target are counted as "hits." Differences typically are discounted as noise. In order to accurately judge the success of a remote viewing session, it is necessary to have controls, so that one can judge whether the resulting sketches are more similar to the correct target than to a set of control targets.

A group of viewers from HRVG, led by Jimmy Williams, approached the James Randi Educational Foundation (JREF) and were in turn referred to the TASC for preliminary verification. A protocol was agreed involving ten pictures chosen by Williams. From these ten pictures, one was selected at random, and a typed description was encrypted using a secret password and forwarded to Williams.

The remote viewers then did their best to figure out which picture had been chosen. The description, since it was encrypted, might seem to have no relevance, but according to Williams, "The depth of personal involvement deepens the amount of intent present in the target designation process." At the end of the week, Williams examined and judged the results, and sent his best guess about which picture had been chosen. He was happy to report that, "The last target went really well. We had no problem identifying which one it is." He encrypted the prediction and sent it to TASC.

The first picture was discarded, and the process repeated. This time he reported that they were having more difficulty. "They are able to select out *the one*, but they are also picking up some trace data from the others." He was assured that pictures that had not been selected were not being examined. TASC did its best to give HRVG every advantage, so that the "signal" would be as clear as possible, while the "noise" would be negligible.

The test was repeated a third time. He commended two of his viewers for doing such an excellent job on this one, drawing sketches that could easily be identified with one of the ten pictures. We exchanged passwords, and it was time to look at the results. The probability of getting all three pictures right was one in 720. Unfortunately, none of the three pictures predicted were correct. For example, on the first target, which had gone "really well," the sketches clearly resembled a statue of King Kamehameha (one of the ten targets), but the correct target was actually a picture of an astronomical observatory.

Mr. Williams was disappointed to discover that JREF was unwilling to retest him for a period of one year. I pointed out to him that it would take at least a year before the technique was refined enough to have any chance of claiming the prize. TASC has offered to help him develop a more reliable protocol, but apparently the hard work of scientific testing has lost its appeal to this group of remote viewers.

—Eric Carlson

Eric Carlson is a physicist at Wake Forest University and president of the Triad Area Skeptics Club.

In Brief

• The American Association for the *Advancement of Science has issued a* statement on the Kansas State Board of Education decision to remove references to evolution and cosmology from its state education standards. It said the decision "is a serious setback for public education in the state of Kansas. . . . To become informed and responsible citizens . . . students need to study and judge for themselves the empirical evidence and concepts central to current citizens. . . . [L]earning and inquiry are severely inhibited if teachers are placed in a position where they may feel pressured to alter their teaching of the fundamental concepts of science in response to demands external to the scientific disciplines. . . . The AAAS urges the citizens of Kansas to restore the topics of evolution and *cosmology to the state curriculum* . . . [and] that the AAAS and others committed to education excellence in science work aggressively to oppose measures that could adversely affect the teaching of science wherever they occur. . . ." The resolution was adapted by the AAAS Board of Directors on October 15, 1999, and published in the November 12 *Science* (286:1297).

• CSICOP Fellow Eugenie Scott received the second Bruce Alberts Award for Distinguished Contributions to Science Education at the 39th American Society for Cell Biology Annual Meeting in Washington December 11–15, 1999. The Award, presented by Alberts, President of the National Academy of Sciences and a faculty member at the University of California, San Francisco, recognizes Scott's "dedication to protecting the teaching of evolution through writing, speeches, media appearances, and importantly, presentations to school boards, teachers, churches, and parents." Scott, a physical anthropologist, is executive director of the National Center for Science Education. She

recently completed a three-year term as a member of the CSICOP Executive Council. She wrote "The 'Science and Religion Movement': An Opportunity for Improved Public Understanding of Science?" in the SKEPTICAL INQUIRER's July/August 1999 special issue on science and religion.

• Bruce Alberts, President of the National Academy of Sciences, has praised the New Mexico State Board of Education decision to reinstate evolution in state science content standards (SI, News & Comment, November/December 1999). In a letter to Flora M. Sanchez, President of the New Mexico Board of Education, Alberts says: "I write to thank and congratulate you on your important efforts to improve the New Mexico State Standards for Science Education so as to make them more effective for all of New Mexico's students. I have read the proposed revisions and consider them to be a significant improvement over the [previous] language. . . .To disregard what we know from science in any one area for the sake of political expediency threatens the basis for the rationality on which our society depends for wise judgments. And the concept of biological evolution is one of the most important ideas ever generated by the application of scientific methods to the natural world." (*NMSR Reports*, December 1999)

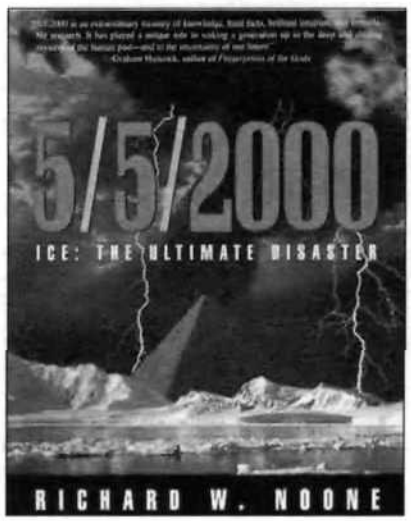
• The controversial (within science at least) Office of Alternative Medicine within the National Institutes of Health was awarded a 37.5 percent budget increase, to $69 million, in the final fiscal year 2000 NIH budget approved by Congress. The percentage increase was even larger than the whopping 14.7 percent increase of $2.3 billion for NIH overall to $17.9 billion. NIH is the main agency for funding biomedical research in the United States, and both it and its growing alternative medicine unit enjoy broad congressional support.

—Kendrick Frazier

May 5, 2000: Will You Survive the Cosmic Y2K Glitch?

Hang on to all the canned goods you stockpiled for Y2K. The year 2000 is not done yet. And if you believe Richard W. Noone's scenario of the coming global apocalypse, don't make plans for Memorial Day.

Noone believes that on May 5, 2000 (give or take a few days), the Earth's axis will suddenly lurch out of position. This cosmic realignment will create apocalyptic stresses here on Earth. Noone believes that we can expect anything from "a few earthquakes" to the collective revolt of every natural phenomenon. Tectonic plates will shift creating megaquakes. Polar ice will melt, raising sea levels by hundreds of feet. Supersonic winds will blast cities to rubble, and massive walls of ice jarred from their polar repositories will careen over the planet scything down everything in their path.



Noone's book, *5/5/2000 Ice: The Ultimate Disaster* first came out in the early 80s (the latest edition came out in 1997). The book offers a smorgasbord of possible causes for an *à la carte* menu of disasters. Some of his theories are outdated, but he has all possible pseudoscientific bases covered. One possibility is that Mercury, Venus, Mars, Jupiter, Saturn, the Sun and Moon will line up on one side of Earth on May 5, destabilizing our little blue marble.

Another is that as Earth cools (this idea was formulated before the measurements of global warming), an ice buildup at the poles will unbalance the planetary center of gravity. Noone arrays a free association of claims to back up his hypotheses: the mathematical and astronomical symmetries of the Egyptian pyramids, Masonic lore, the Shroud of Turin, the Aztecs, Atlantis, and the lost continent of Mu all figure in his body of evidence. According to Noone, the date May 5, 2000, was known to the sages of Egypt thousands of years ago and incorporated right into the dimensions of the pyramids.

If esoteric lore doesn't convince you, maybe the evening weather reports will. On his Web site, www.rnoone.com, Noone writes: "Some of the signs we can all see is the increase in strange and severe weather. We also note that we are having more hurricanes, storms and abnormal weather along with increases in earthquake activity. The Pacific Northwest is experiencing weather that no one in the area can ever remember happening there. More frequent and deadlier hurricanes run up the east coast. Cleveland, Ohio, got buried with snow, the most on record and it goes on and on throughout the world. Can you afford to wait to prepare?"

If you're convinced that nature is signaling impending doom, Noone's site has copious links to www.survivalcenter.com, where you can purchase survival guides, water filters, and other supplies to get you through the coming catastrophe.

Besides, if the mother of all disasters never happens, at least you'll have the supplies on hand for the mother of all Memorial Day barbecues.

—Kevin Christopher

Kevin Christopher is Public Relations Director for CSICOP. □

The Guided Wave Theory of Louis de Broglie and David Bohm

When to the new eyes of thee
All things by immortal power,
Near or far,
Hiddenly
To each other linked are,
That thou canst not stir a flower
Without troubling of a star.

—Francis Thompson,
The Mistress of Vision

I am working out a quantum theory about it for it is really most tantumising state of affairs.

James Joyce,
Finnegans Wake,
p. 149, lines 34–36.

Gerald Fried

David Bohm

There is little doubt that the mathematical formalism of quantum mechanics (QM) is accurate. No theory of physics has been more spectacularly successful in making predictions about the outcome of measurements. Some are accurate to many decimal places. Where experts disagree is not about the mathematics of QM but about how to interpret its equations. Even more than relativity theory, QM bristles with wild paradoxes that radically violate common sense and for which at present there are no agreed-upon resolutions.

The most notorious of these paradoxes is the EPR, named after the initials of Einstein and two associates, Boris Podolsky and Nathan Rosen. In 1935 they published an explosive paper in which they argued that their paradox proved that QM is incomplete, destined to be replaced or radically modified by a deeper theory.

The EPR paradox has several forms, but the easiest to understand was proposed by the late American physicist David Jacob Bohm (1917–1991). It involves a mysterious property of particles called spin. Spin is roughly similar to the motion of a top because it has angular momentum that always takes one of two forms variously called left or right, plus or minus, up or down. Imagine a quantum reaction that creates two identical particles A and B which go off in opposite directions. In standard QM each particle has its left and right spins "superposed." When particle A is measured for spin, its "wave function" (a formula specifying the probabilities that certain values will be found when a particle is measured for a given property) is said to "collapse" (vanish). The particle at once acquires either a left or right spin with equal probability.

Now for the magic. To conserve angular momentum, after A is measured and so acquires a definite spin, B must acquire the opposite spin. Assume that A, measured in Chicago, has a left spin. (Remember, it does not have a definite spin until measured.) On a planet in a distant galaxy a physicist measures B when it gets there. It is certain to have a right spin. How does B "know" the outcome of the measurement of A? Does A send some kind of telepathic signal to B, either simultaneously or at a speed equal to or exceeding the speed of light? Einstein ridiculed this as "spooky action at a distance." He believed that his proposed experiment, then only a thought

Martin Gardner's two-volume Annotated Alice *has recently been reprinted in a one-volume edition.*

Fund for the Future

CSICOP AT THE CENTER FOR INQUIRY

CFI-International
Amherst, N.Y.

Promote CSICOP

Using the Media & Telecommunications to Promote Science and Reason

The Fund for the Future is a capital campaign to provide CSICOP with the resources needed to more effectively influence media and public opinion. The 90s were defined by a telecommunications revolution, along with an explosion of misinformation available to the scholar and citizen alike. The hunger for superstition, pseudoscience, the paranormal and miraculous solutions has never been more acute.

The Ten-Year Plan

CFI-Midwest
Kansas City, Mo.

Contributions are needed for current priorities:

- Increased media appearances by skeptical spokespersons
- Press releases, opinion pieces and media alerts
- Greater exposure through the Internet, including webcasting
- National initiatives coordinated by the Council for Media Integrity
- Instructional materials introducing skepticism to elementary and secondary school students
- Video production

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CFI-West
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We depend on the support of readers and friends to continue leading the international skeptical movement. Gifts to the Fund for the Future provide the resources we need to respond to today's challenges.

All gifts are gratefully accepted. The Fund for the Future welcomes gifts of encouragement and major investments.

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Bill Nye "The Science Guy," Joe Nickell, and entertainer Steve Allen appear on a radio show.

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Co-chairs of the Fund for the Future Campaign: above, author and TV personality Steve Allen; below, author and critic Martin Gardner.

Council for Media Integrity

Formed just weeks after its inclusion in the Ten-Year Plan, the Council for Media Integrity monitors and challenges media programs that convey unfounded claims and mislead the public about science. Members include Steve Allen (co-chair), E. O. Wilson, Stephen Jay Gould, and many others. CSICOP will invest in electronic infrastructure to facilitate rapid response to irresponsible programs.

Enhanced Library Resources

The Center for Inquiry's skeptics' library—already the finest of its kind in the world—needs additional funding to enlarge its core collection and add electronic media. Worldwide modem access to the library's catalog is already nearly complete.

Adult Education

The Council cosponsors the Center for Inquiry Institute, which has already expanded its offerings to include a new three-year certificate program in science and skepticism. Courses are scheduled in Amherst, Los Angeles, and other cities.

Regional Outreach

With the establishment of The Center for Inquiry–West (Los Angeles), The Center for Inquiry–Midwest (Kansas City) and The Center for Inquiry–Rockies (Boulder, Colorado), giant steps have been taken to enhance direct field service to skeptical activists. Additional regional centers are planned, with expanded calendars of activities.

Focusing Upon the Young

To present the skeptical message more compellingly to the young, CSICOP will develop new materials—ranging from age-appropriate print publications to audio and video cassettes and instructional coursework. Goals include enhanced understanding of science and improved critical thinking skills.

experiment, proved that QM was not complete. There must be local "hidden variables" giving definite spins to both particles before one is measured.

The standard Copenhagen interpretation of QM, based on the opinions of Niels Bohr, is that regardless of how far apart A and B get, they remain a single quantum system with a single wave function. When A is measured, the entire system's wave function vanishes and the two particles simultaneously acquire opposite spins. The particles are said to be "correlated," or in more recent terminology, "entangled."

Does this resolve the paradox? It does not. The mystery remains of how A and B can stay entangled when they are light-years apart unless there is some kind of connection between them that allows information to go from A to B.

All physicists agree that there is no possibility of sending coded messages by using the EPR phenomenon. The situation is like two persons, one in New York, the other in Paris, who simultaneously flip a penny. For reasons unknown, if one penny falls heads, the other must fall tails, and vice versa. If one could control the outcome of a flip in Chicago, then of course the Chicagoan could send a message in a binary code of ones and zeros. But there is no way to control the outcome of a measured spin. Like the heads and tails of a flipped coin, it becomes left or right with equal probability. The sequence of lefts and rights, at each end, is always a random, meaningless sequence. If it were otherwise, cipher messages presumably could be sent with a speed exceeding that of light, thereby violating a basic law of relativity.

The EPR paradox remained unconfirmed until recent years when the late Irish physicist John Stewart Bell thought of a brilliant way to test the paradox over short laboratory distances. The paradox has since been completely validated many times. The two entangled particles behave precisely as QM predicts.

Several conflicting efforts have been made to explain the EPR paradox. Here I confine my remarks to how it is resolved by what is called the pilot wave or guided wave theory (GWT). Obviously I'm no expert on QM, only a science journalist, so I haven't the foggiest notion of whether GWT will someday be confirmed. However, this theory, long ignored by physicists, is now gaining increasing support.[1] It deserves to be better known.

In Bohm's revolutionary theory, as refined by his associate Basil Hiley, particles are as real as golf balls. At all times they have precise, unfuzzy properties such as position and momentum, and precise paths through spacetime. The particles are *never* waves.

It was the French Prince Louis de Broglie (pronounced *de Broy*), one of the architects of QM, who first proposed GWT. He abandoned it after heavy ridicule by Copenhagenists, but took it up again after it was improved by Bohm. Now known as the Broglie/Bohm GWT, it has become the interpretation of QM favored by a raft of experts that include Bell, Jeffrey Bub, the French physicist Jean-Pierre Vigier, and many others. So far its predictions are exactly the same as those of the Copenhagen school, although there may be subtle ways it can be tested by difficult experiments not yet performed.

In standard QM every particle can be observed either as a particle or as a wave. The wave is not physical, like water or sound waves, but a wave of probability in an abstract space. When a photon goes through one slit in a barrier, to register on a detection screen, it is a particle. When two slits are open, the photon behaves like a wave and it is impossible to tell which slit it goes through without destroying the wave. If many photons are sent through a barrier with two openings, each registers on the screen as a particle, but they display an interference pattern that could only be produced by a wave going through both slits. The photon is a mysterious thing. It is neither wave nor particle, but something that can act like one or the other depending on the measuring apparatus.

In Bohm's revolutionary theory, as refined by his associate Basil Hiley, particles are as real as golf balls. At all times they have precise, unfuzzy properties such as position and momentum, and precise paths through spacetime. The particles are *never* waves. Associated with each particle is an invisible, undetectable wave in a field which Bohm called the "quantum potential." Its pilot waves are real waves, not probability waves. They guide the particle's motion in a manner somewhat like the way a river's wave guides the movement of a floating leaf, or, in a better analogy, the way radar information guides a ship. This quantum field, like the fields of gravity and electromagnetism, permeates all of spacetime, but unlike those fields its intensity doesn't diminish with distance. Also unlike other fields, it exerts no force on particles. Essentially it is a wave of undecaying information.

It is the *ad hoc* nature of this undetectable pilot wave that reminds so many of Bohm's antagonists of the old stagnant ether of the nineteenth-century, a substance that could not be detected as a carrier of electromagnetic waves, and which Einstein discarded as useless. As J.C. Polkinghorne, in his marvelous little book *The Quantum World* (1984) said: "In the opinion of many Bohm had jumped out of the indeterminate frying pan into a crackling non-local fire."

When just one slit is open, the pilot wave guides each photon through the opening and there are no interference bands. When both slits are open, each particle goes through just one slit, but its pilot wave, quite separate from the particle, goes through both to guide a stream of photons along paths that produce the wave interference pattern on the screen. It is not a case of an entity

being either a wave *or* a particle, but a case of there always being present both a wave *and* a particle. Comic versifier Armand T. Ringer put it this way:

> As a photon flew close to slit 2,
> She said to her pilot wave, "you
> Must slide through both slits,
> Or Bohm's fans will have fits,
> And be forced to abandon their view."

Here is how GWT explains the EPR paradox. When A is measured, its guiding wave, in the unobservable quantum potential field, twists A into either a left or right spin. At the same instant, no matter how far away B is, it twists B the opposite way. This invisible field, extending throughout the cosmos, has the nonlocal power to act simultaneously on both particles. No information travels from A to B. Instead, it travels simultaneously from the quantum field to the two particles, giving them opposite spins. This, of course, is action at a distance, and was probably the main reason Einstein did not care much for Bohm's theory.

How does the pilot wave manage to guide the paths of particles? This is one of the darkest mysteries of GWT. It is able to push particles around without at the same time exerting any force on them. If it did, photons would have their energies altered. But this doesn't happen. The photons arrive on the screen without any change of energy. Somehow each photon must pick up information from its pilot wave without having its energy modified. This may be spooky, but no more spookier, say Bohm's supporters, than the probability waves in orthodox QM which decide on how a wave function will create certain properties when it collapses.

Could the two particles of the EPR paradox be just projections in our space of a single particle moving in a higher dimension? Bohm once speculated on this possibility. Imagine a tank, he wrote, in which a fish is swimming. Two television cameras film the tank from two different directions. We see only the two films projected on two screens. We think we are watching two fish, and are amazed by the curious way their movements are correlated. The tank is in the unseen higher dimension. In Bohm's later terminology, it is in the "implicate order" which lies beyond the "explicate order" of the world open to our experience. What we think are two fish are really projections in our world of a single entity.

Bohm suffered all his life by the contempt with which followers of Bohr viewed his GWT. Bohr called it "foolish." J. Robert Oppenheimer called it "juvenile deviationism," and advised physicists to ignore the theory. Even Einstein, who for a time admired de Broglie's work, decided that Bohm's GWT was "too cheap" a way to resolve QM paradoxes.

Bohr's antagonism toward Bohm was extreme. The German-born physicist Ernest J. Sternglass, who favors Bohm's pilot wave, tells in his book *Before the Big Bang* (1997) about a meeting with Bohr during which they discussed Bohm's theory. "It was embarrassing," Sternglass writes, "for me to see Bohr so emotionally upset about Bohm's work. . . . The vehemence of this otherwise mild-mannered and kindly man really surprised me . . . it seemed to me that Bohr had almost the fanatical approach of a fundamentalist preacher, intensely concerned to save my soul from perdition."

Mathematician David Wick, in his great book *The Infamous Boundary* (1995)—the title refers to the gulf between the micro world of QM and the macro world of relativity theory, cosmology, measuring apparatus, and you and me—bashes Richard Feynman for a similar opposition to Bohm. Feynman is often quoted, from his famous "red books" of lectures, to the effect that nobody understands how the double slit experiment works. "The question is," Feynman asks, "how does it really work? What machinery is actually producing this thing? Nobody knows any machinery. Nobody can give you a deeper explanation of this phenomena than I have given; that is, a description of it."

"Very well," comments Wick, "what is wrong with the pilot wave?" Wick attributes Feynman's "overheated rhetoric" to his refusal, like that of von Neumann, Heisenberg, and other quantum experts, to take Bohm seriously.

The great Hungarian mathematician John von Neumann wrote a famous book about QM in which he thought he proved that QM could never be modified by introducing hidden variables. By this he meant local hidden variables—variables attached to particles. He failed to realize that QM could be modified by introducing non-local variables such as Bohm's quantum potential. It is a scandal that so few of today's physicists and their students realize that Bohm succeeded in doing exactly what von Neumann thought was impossible. We can describe his achievement by altering some words in a well-known poem by Eddie Guest:

> Von Neumann said that it couldn't
> be done,
> But Bohm with a chuckle replied,
> That maybe it couldn't, but he
> would be one
> Who wouldn't say so til he tried.
> "A quantum potential? The field is
> essential!"
> If David Bohm doubted he hid it.
> He started to sing as he tackled the
> thing
> That couldn't be done, and he did it!

Bohm's quantum potential binds the entire universe together into what he liked to call a seamless "unbroken wholeness." Every particle in the universe is connected by the quantum potential to every other particle. He

How does the pilot wave manage to guide the paths of particles? This is one of the darkest mysteries of Guided Wave Theory. It is able to push particles around without at the same time exerting any force on them. If it did, photons would have their energies altered. But this doesn't happen.

likened the cosmos to a hologram in which each point on the film carries information about the entire picture. Bohm's GWT, far more sophisticated than de Broglie's crude version, is a "holistic" vision in which all parts of the universe are joined to every other part. "Interconnectedness" was one of Bohm's favorite words. He saw the universe as resembling the unity of a living organism, a kind of pantheism not unlike Spinoza's—a pantheism Einstein himself favored.

Although Bohm's GWT is identical with standard QM in its predictions, its way of talking about quantum phenomena is entirely different. The randomness of the Copenhagen interpretation which so disturbed Einstein ("God does not play dice") is replaced by a strict determinism. There are no quantum jumps. No superpositions. No collapsing of wave functions. Indeed, there is not even a "measurement problem." The probabilities of QM, which seem to spring from pure chance in Bohm's theory, result from our ignorance of a true, highly complicated, state of affairs. The universe is real, "out there," independent of you and me. Human consciousness is not essential, as von Neumann and Eugene Wigner, and others supposed, to collapse wave functions.

Like Einstein, Bertrand Russell, Karl Popper, and almost all philosophers and scientists, Bohm was a thoroughgoing realist in believing that the universe and all its laws are independent of human minds. The Moon is "out there," regardless of whether it is observed by any creature. Bohm would have been horrified by the social constructivism of today's postmodernists who see all science and even mathematics as cultural creations similar to art, music, and fashions in clothes.

John Bell, who died in 1990 at age 62, became an enthusiastic defender of Bohm. Bell was convinced that Einstein was intellectually superior to Bohr, a deeper thinker who saw clearly the need for QM to rest on a subquantum level (Bohm's potential field) that would restore both realism and determinism. Here is how Bell puts it in his paper "Six Possible Worlds of Quantum Mechanics," reprinted in his entertaining book *Speakable and Unspeakable in Quantum Mechanics* (1987)

> Is it not clear from the smallness of the scintillation on the screen that we have to do with a particle? And is it not clear, from the diffraction and interference patterns, that the motion of the particle is directed by a wave? De Broglie showed in detail how the motion of a particle, passing through just one of two holes in screen, could be influenced by waves propagating through both holes. And so influenced that the particle does not go where the waves cancel out, but is attracted to where they cooperate. This idea seems to me so natural and simple, to resolve the wave-particle dilemma in such a clear and ordinary way, that it is a great mystery to me that it was so generally ignored.

My next column will be a sketch of Bohm's life, with special focus on his friendship with the Indian philosopher and mystic Jiddo Krishnamurti.

Note

1. See, for example, David Z. Albert's vigorous defense of Bohm's theory in "Bohm's Alternative to Quantum Mechanics," in *Scientific American* (May 1994). Albert is a professor of philosophy at Columbia University, with a Ph.D. in physics. More on Bohm's theory can be found in his book *Quantum Mechanics and Experience* (Harvard University Press, 1992.)

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The Inquisitive Skeptic Workshop
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This workshop is for those who are not content simply to call themselves "skeptics." Rather it is for those who want to go beyond the label and get hands-on experience investigating and thinking about actual cases involving paranormal and extraordinary claims. Each participant will be assigned to a team. Each team will be assigned an actual case to investigate and consider. For this first case, the team will be guided by one of the faculty members. Each team will then report, and receive feedback, on the results of its investigation. Next each team will be assigned a new case and will work on this second task without faculty supervision. Finally, everyone will meet in a plenary session in which the teams will report on their findings and discussions will take place.

For more information contact Barry Karr at:
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Aura Photography: A Candid Shot

At psychic fairs and other popular venues, "aura" photographic portraits are all the rage. But are they really what they are claimed to be?

According to belief that has persisted since ancient times, the aura is a radiance from the "energy field" that supposedly emanates from and surrounds all living things. It is perceived not by ordinary vision but by clairvoyance. Although "no evidence has been found to prove its existence" (Guiley 1991), the concept has thrived as pseudoscience. For example, in his 1911 book, *The Human Atmosphere*, Dr. Walter J. Kilner claimed he could not only see the aura and use it for medical diagnoses, but he also accepted the validity of nonexistent "N-rays" and clairvoyance. *The British Medical Journal* rightly scoffed.

Today self-professed "medical intuitives" like Caroline Myss (1997) claim to describe the nature of people's physical diseases by reading their "energy field." Thus Myss "can make recommendations for treating their condition on both a physical and spiritual level." She calls this supposedly auric process "energy medicine," but offers no scientific evidence to substantiate her alleged powers. (*New Age* magazine stated Myss no longer gives readings, and quoted me as terming the practice "offensive and dangerous" [Koontz 2000, 66, 102].)

The human body does, in fact, give off certain radiations, including weak electromagnetic emanations (from the electrical activity of the nerves), chemical emissions (some of which may be detected, for instance, as body odor), sonic waves (from the physical actions within the body), etc. Paranormalists sometimes equate these radiations with the aura (Permutt 1988, 57–58), but they do not represent a single, unified phenomenon, nor have they been shown to have the mystical properties attributed to auras.

Figure 1. Author posing for "aura" photograph with hands placed on sensors. Photo by Ben Radford.

If psychics could actually see the purported energy fields, one wonders why, as Guiley (1991) observes, their composition "is the subject of conflicting opinions." She states: "No two clairvoyants see exactly the same aura. Some say they see the entire aura, divided into different layers or bodies, while others say they see only parts of the aura." In fact, tests of psychics' abilities to see the alleged radiant emanations have repeatedly met with failure. One test, for example, involved placing either one or two persons in a completely dark room and asking the alleged psychic to state how many auras she saw. Only chance results were obtained (Loftin 1990). James Randi conducted another test for a television special, offering $100,000 for successful results. The psychic challenger selected ten people she maintained had clearly visible auras, and agreed that the auras would extend above the screens behind which—*unseen by her—the people were to* stand. Unfortunately, in choosing which screens supposedly had people behind them, the psychic got only four out of ten correct guesses—less than the five that chance allowed (Steiner 1989).

Once at a psychic workshop I volunteered as the subject whose aura others were instructed to visualize. I stood in front of a blank wall while the instructor noted how my energy field expanded and contracted as I inhaled and exhaled. Actually, I held my breath for long periods, while raising and lowering my chest and shoulders to simulate breathing. Such is the power of sug-

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gestion that some imaginative initiates "saw" the alleged effect despite the negating conditions.

In addition to purportedly seeing the aura, some mystics claim they can actually detect it by such means as dowsing. For example, while inspecting a crop circle near Silbury Hill in southern England, I had my auric field checked by a local dowser who had used his divining rod to convince himself the circle was genuine, produced by earth spirits. Although my aura supposedly measured only a few inches, after I had compliantly meditated for a few moments it expanded to several feet—or so the rhabdomancer claimed (Nickell 1995).

Not surprisingly, there have been various attempts to photograph the aura. For example, in the 1890s a French army officer tried to record alleged psychic force fields on photographic plates but with reportedly poor results (Permutt 1988, 89). Claims that the aura has been successfully photographed are typically based on a misunderstanding of the simple scientific principles involved. For instance, while infrared photography can produce images of people with aura-like bands of radiance around them, these are actually only emanations of body temperature (Nickell 1994; Permutt 1988, 123).

More serious claims that the aura could be demonstrated scientifically through Kirlian photography were publicized in the 1970s. In this non-camera technique a high-voltage, high-frequency electrical discharge is applied across a grounded object. The "air glow" or "aura" that is yielded can be recorded directly onto a photographic plate, film, or paper. Such Kirlian images (named for the Russian inventor of the process, Semyon Kirlian) show fuzzy glows around fingers, leaves, and other objects (Ostrander and Schroeder 1971).

Although the Kirlian aura was claimed to present information about the "bioplasma" or "life-energy" of the object, actually it is only "a visual or photographic image of a corona discharge in a gas, in most cases the ambient air." Moreover, experiments have failed to yield any evidence that the coronal pattern is related "to the physiological, psychological, or psychic condition of the sample," but instead only to finger pressure, moisture, and other mechanical, environmental, and photographic factors (some twenty-two in all). Skeptics observed that even mechanical objects, such as coins or paper clips, could yield a Kirlian "aura" (Watkins and Bickel 1986).

Following in the Kirlian tradition is a development called Aura Imaging photography introduced in 1992 by Guy Coggins, a California entrepreneur with

Figure 2. "Full body aura photograph" of author with dramatic yellow-white burst of radiance.

a background in electronic engineering. Coggins's Aura Camera 6000 is a combined optical-electrical system that produces a Polaroid color photograph of the subject together with his or her "electromagnetic field or aura." Coggins's company, Progen, also markets a software program called WinAura that allows one to "see the aura move and change like a movie in real time on your computer or TV screen" and to "print your aura image from your computer printer" (Progen 1999).

Coggins concedes that most who purchase and use his device fail to understand how it works. "These people live quite different lives than the rest of us," Coggins told a reporter. "Sometimes, we have trouble explaining to them how to plug the thing in" (Sullivan 1999). Scientists, on the other hand, continue to be skeptical of all claims made about the alleged aura. Observes Sullivan (1999):

> The reason little of the research on energy, auras, and energy healing has been accepted by the scientific community is that it's unpredictable. To be proven as concrete, science demands that an action, performed in the same way under the same circumstances, must yield the same results. No such luck in this area, Coggins admits.
>
> "None of this is duplicatable. It works once, but maybe not the next time. So there's no way to prove it, according to scientific standards."

But what about Coggins's aura-imaging technology? Can a photograph lie? I was intrigued by the process, which I found demonstrated at a psychic fair at Olcott Beach in western New York (July 17, 1999). There I posed for my very own "Full Body Aura Photograph." Actually, I had two such photos made (at $20 each), and therein lies a story. I was invited to stand facing the camera with my hands on electrical modules wired to both the camera and a computer printer (figure 1). I soon received a color Polaroid photograph plus a printout (copyrighted by Progen) showing a simplistic asterisk-rendered outline of a human figure arrayed with letters that indicated color areas ("B" for blue, "G" for green, etc.). These roughly correlated with the areas of colored light in the photo.

The photograph (figure 2) showed such an intense "energy field" of yellow-bordered white light that it washed out my facial features. The printout designated this area as "Yellow" and interpreted it (in grammatically unparallel fashion) as "Sunny, Exhilaration." (Small areas of "Green"—"Healing, Teaching"—were shown on either side.) One of the enterprise's "experienced Certified Aura Imaging Counselors" told me the bright area of light showed I had prominent "spiritual" qualities.

As I reflected on what had transpired, it occurred to me that a single such picture is little more than a novelty, while two would represent the beginning of an investigation. When I returned to the booth for a second portrait, the proprietor seemed discomfited, asking me why I wanted another. I expressed curiosity, wondering aloud whether different moods would affect the outcome. She said it would, jokingly

cautioning me not to think about *sex* and—when I asked what would happen—telling me the color red would predominate.

In fact, however, while I (blush) thought vividly about the warned-against subject (purely in the interests of science, of course), my aura was depicted in the resulting photo (figure 3) as predominately blue ("Peaceful, Contemplative") and green ("Healing, Teaching"). Since I was accompanied by some college students (summer interns at the Center for Inquiry), I was told that the results were due to the fact that, obviously, I had been "teaching" *the students in the interim between* photo sessions.

My own interpretation was that the radically different photos demonstrated a lack of any consistency that might justify people thinking of their aura as an expression of their inherent individuality. (An accompanying brochure spoke to the reader about "your personal energy field," and Coggins insists, "The aura is individual, like a thumbprint" [Ziegler 1996].) Instead, the disparity seemed attributable to an ever-changing light display that did not seem to correspond to moods—at least not on the occasion I tested the system.

Indeed, a look at the actual process employed—described by Coggins as "intensified Kirlian imaging"—shows it to be not the actual image of the body's unseen image field but the imitation of such a field based primarily on something called skin resistance. That is one of the physiological variables measured by a galvanometer as part of a polygraph or "lie detector," whereby an unfelt electrical current passes through the subject's hands and detects sweat-gland activity associated with nervousness. (Cheap lie detectors—as well as the "E-meters" used by Scientologists in their controversial pyschotherapeutic technique called "auditing" [Behar 1999]—are essentially only galvanometers.)

As one source explains the aura camera's technique (while neglecting to mention that the electrical current is induced):

> The hand plates on the electronic modules contain sensors that are located at specific acupuncture points on each hand. Each one of the points corresponds to a different area of the body.
>
> Coggins said the sensors pick up the electrical current on the skin at each of those locations. This current is called "skin resistance."

Next, according to this source:

> The computer plots the information from the sensors. Within the camera is a liquid crystal display [LCD] of different colors. Each electrical frequency plotted by the computer is assigned a different color. The higher frequencies are assigned warmer colors—reds, yellows, oranges. The lower frequencies fall toward the cooler end of the spectrum—blues and purples. Greens and shades like turquoise, aquamarine, and yellow-green fall into the center of the vibrational spectrum. Coggins said he worked with psychics who helped him interpret the frequencies, and the colors they could represent. People with a lot of high energy in their field—red and orange—are described by most clairvoyants as vibrant and passionate.

Figure 3. Second "aura" photo, made only minutes after the first, with subdued tones of blue and green.

Finally,

> The LCD flashes lights according to the pattern and frequencies plotted by the computer. The Polaroid film is thus exposed to the colored lights, which show up on the photograph in the areas of the body where the corresponding electrical currents were sensed (Sullivan 1999).

This torturous process—involving obtaining dubious electrically stimulated data from the hands, extrapolating it by analogy to acupuncture to the entire body, translating the electrical frequencies into alleged color equivalents, and then substituting for them simple flashes of colored lights—can scarcely be called photographing the aura. As is typically the case with photographs of alleged paranormal phenomena, what you see is not what you get.

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Apocalypse Lost

While the world at large is quite relieved at having survived all the threatened computer system crashes, financial meltdowns, and collapses of public services that had been prophesied for Y2K, there is a keen sense of disappointment on the part of the prophets of gloom-and-doom, even a sense of lost opportunity.

The Web site of fundamentalist authors Tim LaHaye and Jerry Jenkins (www.leftbehind.com), whose best-selling *Left Behind* thrillers describe what happens to the rest of the world after The Rapture carries off the true Christians, used to carry alarums about the Y2K bug triggering "financial meltdown," making it possible for "the Antichrist or his emissaries to dominate the world commercially until it is destroyed." However, when the deadline was fast approaching, Jenkins was downplaying the doom, telling the *Washington Post* (December 27, 1999) that "we regret having talked about [the prediction]." Fundamentalist evangelist Jerry Falwell had been distributing a packet and video on "The Y2K Time Bomb," urging people to stock up on supplies and foodstuffs. He warned that "Y2K is God's instrument to shake this nation, to humble this nation." However, by December Falwell had withdrawn the video, and stated "I don't anticipate any major problems."

By the end of December, fundamentalist-survivalist author Gary North, who as recently as October 1999 had been thundering that the Y2K bug would bring about "the breakdown of Western society" (see this column, January/February 1999) had toned down his flaming Doomsday rhetoric. Instead of warning of an imminent return to a nineteenth century style of living, North could only threaten the eventual collapse of the banking system: "Things will not break down all at once in early January unless the power grid goes down and stays down. But the domino effect will create ever-increasing institutional noise and confusion throughout January and beyond. Your check will not be in the mail." By the second week in January, North, ever hopeful, was still warning of looming "cascading cross defaults" in the banking system, which somehow failed to materialize (see www.garynorth.com). To keep the flames of Y2K panic still burning, North was reduced to compiling a Y2K "Glitch report" on his Web site. It chronicles such world-shaking events as accounting problems in restaurants and other businesses, failures in university and government computing systems (many of which seem entirely unrelated to Y2K; computer problems were not unknown in the years leading up to 1999). Whenever any computer system anywhere failed in any way, North saw in it a flicker of hope for his post-technological theocratic utopia.

Software guru Ed Yourdon is co-author with his daughter of the best-selling *Time Bomb 2000*, which Dr. Dobbs Electronic Review of Computer Books characterized as "600 pages of absolute nonsense. Open anywhere, shake the book upside down, and out billows a smothering cloud of horsefeathers." On the quiet morning of Saturday, January 1, 2000, Yourdon wrote on his Web site, "Some, and perhaps many, Y2K bugs have not become visible yet." When time passed and the threatened Y2K calamities failed to materialize, he replaced the Web page that used to promote his the-sky-is-falling book with the following note: "Now that Y2K has come and gone, we've removed the material that was posted here about our *Time Bomb 2000* book." Yourdon, attempting to regain the solid reputation he had before he became a Y2K Cassandra, now has this to say on his Web site: "For many, Y2K was truly a 'bump in the road,' or BITR—not only in terms of technological disruptions, but also in terms of the impact it had on our personal lives and relationships. But for at least a few, Y2K wrought a profound and permanent change: Even if the computer systems didn't collapse, the Y2K-related threat of such a collapse has made us re-examine our lives, redefine our priorities, and re-focus our energies for the future." Amen, brother.

But lest we grow complacent, the Year

Robert Sheaffer's World Wide Web page for UFOs and other skeptical subjects is at www.debunker.com.

2000 Institute warns that we're still not home free. For one thing, the conversion of European currencies to the euro is supposedly headed for computer-induced disaster: "At least 25 percent of the ten million euro applications are expected to fail between the years of 1999 and 2004, causing major economic upheaval." For another, we still had not (as of this writing) made it safely through Leap Year Day of 2000: "It has been estimated that more than two million applications will experience this particular Leap Year problem. Most such problems will be resolved, but several hundred thousand are likely to fail. In the case of COTS spreadsheet applications, this could translate into billions of individual failures, a handful of which will prove catastrophic to those using them."

And these doomsayers also warn of yet another looming cyber-catastrophe. The Year 2000 Institute warns that on September 8, 2001, the clock will roll over on millions of systems installed worldwide running the UNIX operating system. "This is an event of Epoch [*sic*] proportions—quite literally!" they warn. "It is estimated that twelve million applications will be affected, more than one million of which will not be repaired in time."

* * *

New York City thought it had found a promising way to remove the unemployed from its welfare roles: train them as telephone psychics. The *New York Times* reported on January 28 that the city's welfare department had already placed fifteen welfare recipients to work at home for The Psychic Network, and was seeking more. "Clairvoyance is not among the qualifications listed on the city's recruitment flier," reports the paper. However lest any potential customers should doubt the qualifications of those who might be recruited into such positions, the city promised that The Psychic Network will train its new recruits in the reading of Tarot cards.

While potential "psychics" were promised $10 to $12 per hour (while bringing in a potential hourly revenue of up to $299.40 for the employer), in reality they typically would get far less. They are paid only for those minutes that they are actually connected to a client, and are trained in tricks to keep the client on the line as long as possible. One such trick is to pretend to be receiving—slowly, ever so slowly—a vision of winning lottery numbers. On the plus side, the employee receives a 25-cent bonus for every name and address that can be extracted from a client, to be placed on a sucker list (provided that their paycheck doesn't ultimately bounce, as many have reported).

Robert J. Buchner, an assistant attorney general in Fort Lauderdale, Florida, the hub of the telephone psychic industry, reports that his office has received hundreds of complaints from across the country. Most complain that the operation padded their telephone bill with charges they never knowingly incurred, and then, adding insult to injury, switched their long distance service to another carrier without their permission. Judy Ann Cannizzaro, a former telephone psychic, suggested that in New York City "Welfare is probably going to be dealing with welfare," noting that many of her former clients were very low-income people "with problems that not even a soap opera can list."

However, the publication of the article caused such a fracas that later that same day, the city's Human Resources Administration announced the end of its arrangement with the company calling itself The Psychic Network. And no one was more relieved to hear this than Shelley Ackerman, president of the New York chapter of the Astrological Federation of America, who felt insulted that people who had taken a quickie course in Tarot reading were encroaching on the turf, and debasing the reputation, of "astrological studies that have been around for thousands and thousands of years."

* * *

Who takes over running an enterprising Mafia family when its godfather is gunned down by rivals? In at least one case, inexperienced relatives took over the day-to-day operations, while receiving expert advice from beyond the grave. The *Electronic Telegraph of London* reported (February 5, 2000) that two sisters in the Calabria region of Italy "have been arrested as suspected Mafia bosses after phone taps suggested they were consulting their late grandfather via a medium to run their 'family'." Their esteemed grandfather, Don Peppe Zapia, Sr., was known locally as "the Godfather with Nine Lives" because of the many unsuccessful attempts to kill him, before one finally succeeded in 1993. Local newspapers reported that each time the sisters made an important decision, they consulted a medium to get advice from Grandpa and other dead dons in the family. The papers also note that Grandpa's advice could not have been very useful, since he failed to warn them that the police were listening in on their conversations, and that their arrest was imminent. □

Mass Delusions and Hysterias

Highlights from the Past Millennium

Over the past millennium, mass delusions and hysterical outbreaks have taken many forms. Sociologists Robert Bartholomew and Erich Goode survey some of the more colorful cases.

ROBERT E. BARTHOLOMEW and ERICH GOODE

The turn of the second millennium has brought about, in the Western world at least, an outpouring of concern about cosmic matters. A major portion of this concern has taken a delusional, even hysterical turn, specifically in imagining an end-of-the-world scenario. "The end of the world is near," predicts Karl de Nostredame, supposedly the "last living descendent" of Nostradamus; "White House knows doomsday date!" he claims (Wolfe 1999, 8). Against this backdrop, it seems an appropriate time to survey a sample of social delusions and group hysterias from the past millennium. Given the enormous volume of literature, we will limit our list to the more colorful episodes.

The study of collective delusions most commonly falls

within the domain of sociologists working in the sub-field of *collective behavior, and psychologists* specializing in social psychology. Collective delusions are typified as the spontaneous, rapid spread of false or exaggerated beliefs within a population at large, temporarily affecting a particular region, culture, or country. Mass hysteria is most commonly studied by psychiatrists and physicians. Episodes typically affect small, tightly knit groups in enclosed settings such as schools, factories, convents and orphanages (Calmeil 1845; Hirsch 1883; Sirois 1974).

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Mass hysteria is characterized by the rapid spread of conversion disorder, a condition involving the appearance of bodily complaints for which there is no organic basis. In such episodes, psychological distress is converted or channeled into physical symptoms. There are two common types: anxiety hysteria and motor hysteria. The former is of shorter duration, usually lasting a day, and is triggered by the sudden perception of a threatening agent, most commonly a strange odor. Symptoms typically include headache, dizziness, nausea, breathlessness, and general weakness. Motor hysteria is prevalent in intolerable social situations such as strict school and religious settings where discipline is excessive. Symptoms include trance-like states, melodramatic acts of rebellion known as histrionics, and what physicians term "psychomotor agitation" (whereby pent-up anxiety built up over a long period results in disruptions to the nerves or neurons that send messages to the muscles, triggering temporary bouts of twitching, spasms, and shaking). Motor hysteria appears gradually over time and usually takes weeks or months to subside (Wessely 1987; Bartholomew and Sirois 1996). The term *mass hysteria* is often used inappropriately to describe collective delusions, as the overwhelming majority of participants are not exhibiting hysteria, except in extremely rare cases. In short, all mass hysterias are collective delusions as they involve false or exaggerated beliefs, but only rarely do collective delusions involve mass hysteria as to do so, they must report illness symptoms.

Many factors contribute to the formation and spread of collective delusions and hysterical illness: the mass media; rumors; extraordinary anxiety or excitement; cultural beliefs and stereotypes; the social and political context; and reinforcing actions by authorities such as politicians, or institutions of social control such as the police or military. Episodes are also distinguishable by the redefinition of mundane objects, events, and circumstances and reflect a rapidly spreading folk belief which contributes to an emerging definition of the situation.

Middle Ages, France

During the Middle Ages, dozens of outbreaks of hysterical fits and imitative behaviors were reported among repressed nuns in cloistered European Christian convents. "Volunteers" were often forced by their parents into joining religious orders against their will and to lead celibate lives that included vows of poverty and demanding physical labor (Madden 1857). During this time it was widely believed that humans could be possessed by certain animals, such as wolves. In France, cats were particularly despised as they were considered familiar with the Devil (Darnton 1984). It was perhaps this context that triggered an unusual episode of collective behavior, described in the passage below.

> I have read in a good medical work that a nun, in a very large convent in France, began to meow like a cat; shortly afterwards other nuns also meowed. At last all the nuns meowed together every day at a certain time for several hours together. The whole surrounding Christian neighborhood heard, with equal chagrin and astonishment, this daily cat-concert, which did not cease until all the nuns were informed that a company of soldiers were placed by the police before the entrance of the convent, and that they were provided with rods, and would continue whipping them until they promised not to meow any more. (Zimmermann cited in Hecker 1844, 127)

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Fifteenth Century Germany

A nun in a German nunnery fell to biting all her companions. In the course of a short time all the nuns of this convent began biting each other. The news of this infection among the nuns soon spread, and it now passed from convent to convent throughout a great part of Germany, principally Saxony and Brandenburg. It afterwards visited the nunneries of Holland, and at last the nuns had the biting mania even as far as Rome. (Zimmermann cited in Hecker 1844, 127)

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Milan, Italy, 1630

British journalist Charles Mackay (1852, 261–265) described a poisoning scare that terrorized Milan, Italy, in 1630, coinciding with pestilence, plague, and a prediction that the Devil would poison the city's water supply. On one April morning people awoke, and became fearful upon finding "that all the doors in the principal streets of the city were marked with a curious daub, or spot." Soon there was alarm that the sign of the awaited poisoning was at hand, and the belief spread that corn and fruit had also been poisoned. Many people were executed. One elderly man was spotted wiping a stool before sitting on it, when he was accused of smearing poison on the seat. He was seized by an angry mob of women and pulled by the hair to a judge, but died on the way. In another incident, a pharmacist and barber named Mora was found with several preparations containing unknown potions and accused of being in cahoots with the Devil to poison the city. Protesting his innocence, he eventually confessed after prolonged torture on the rack, admitting to cooperating with the Devil and foreigners to poisoning the city and anointing the doors. Under duress he named several accomplices who were eventually arrested and tortured. They were all pronounced guilty and executed. Mackay states that "The number of persons who confessed that they were employed by the Devil to distribute poison is almost incredible," noting that "day after day persons came voluntarily forward to accuse themselves" (264).

Lille, France, 1639

Mackay (1852, 539–540) reports that in 1639 at an all-girls' school in Lille, France, fifty pupils were convinced by their overzealous teacher that they were under Satanic influence. Antoinette Bourgignon had the children believing that "little black angels" were flying about their heads, and that the Devil's imps were everywhere. Soon, each of the students confessed to witchcraft, flying on broomsticks and even eating baby flesh. The students came close to being burned at the stake but were spared when blame shifted to the headmistress, who escaped at the last minute. The episode occurred near the end of the Continental European witch mania of 1400 to 1650, when at least 200,000 people were executed following allegations of witchcraft.

Salem, Massachusetts, 1691–1693

In 1692, Salem Village (now Danvers, Massachusetts) was the scene of a moral panic that spread throughout the region and involved witchcraft accusations which led to trials, torture, imprisonment, and executions. Others died in jail or during torture. At least twenty residents lost their lives. Social paranoia was such that two dogs were even accused and executed! All convictions were based on ambiguous evidence. The witch mania began in December 1691, when eight girls living in the vicinity of Salem exhibited strange behaviors including disordered speech, convulsive movements, and bizarre conduct. Explanations for the "fits" range from outright fakery to hysteria to ergot poisoning of the food supply. By February 1692, the affected girls had accused two elderly women and a servant from Barbados named Tibula of being witches, and they were arrested. Soon hundreds of residents were accused of witchcraft, and trials were held. In May 1693, the episode ended when Governor Phips ordered that all suspects be released (Nevins 1916; Caporael 1976; Karlsen 1989).

London, England, 1761

On February 8, 1761, a minor earthquake struck London, damaging several chimneys. When another tremor occurred on the following month on the exact day as the first (March 8), the

coincidence became the subject of widespread discussion. According to Mackay (1852), a lifeguard named Bell then predicted that London would be destroyed in a third quake on April 5. "As the awful day approached, the excitement became intense, and great numbers of credulous people resorted to all the villages within a circuit of twenty miles, awaiting the doom of London" (259). People paid exorbitant fees to temporarily board with households in such places as Highgate, Hampstead, Islington, Blackheath, and Harrow. The poor stayed in London until two or three days before the predicted event before leaving to camp in fields in the countryside. When the designated time arrived, nothing happened.

Leeds, England, 1806

In 1806, a panic spread through Leeds and the surrounding communities that the end of the world was at hand. The "panic terror" began when a hen from a nearby village was said to begin laying eggs inscribed with the message, "Christ is coming." Large numbers flocked to the site to examine the eggs and see the "miracle" first-hand. Many were convinced that the end was near and suddenly became devoutly religious. Mackay (1852, 261) states that excitement then quickly turned to disappointment when a man "caught the poor hen in the act of laying one of her miraculous eggs" and soon determined "that the egg had been inscribed with some corrosive ink, and cruelly forced up again into the bird's body."

Worldwide, 1835

During the summer of 1835, a series of six newspaper reports appearing in the *New York Sun* caused a worldwide sensation. Created by journalist Richard A. Locke, the paper claimed that astronomer Sir John Herschel had perfected the world's strongest telescope in a South African observatory, and had discovered various life forms on the Moon: a two-legged beaver, a horned bear, miniature zebras, and colorful birds among them. His most astonishing observation was that he could see human-like forms on the Moon flying about with bat-like wings. The creatures were given the scientific name of "Vespertilio-homo" meaning bat-man. These beings were described with angelic innocence, peacefully coexisting with its fellow creatures in an environment apparently absent of carnivores. The delusion began on Friday, August 21, with an ambiguous story about new astronomical discoveries. Great excitement prevailed in New York City and spread around the world; most newspapers had been hoodwinked, including the *New York Times*. Locke published the articles in a pamphlet and sold sixty thousand copies within a month. The New York-based *Journal of Commerce* newspaper eventually unmasked the hoax (summarized from Griggs 1852; Bulgatz 1993).

British South Africa, 1914

In the war scare setting of British South Africa in 1914, local newspapers erroneously reported that hostile monoplanes from adjacent German South West Africa were making reconnaissance flights as a prelude to an imminent attack. The episode coincided with the start of World War I. Despite the technological impossibility of such missions (the maneuvers reported by witnesses were beyond those of airplanes of the period and their capability of staying aloft for long periods), thousands of residents misperceived ambiguous, nocturnal aerial stimuli (stars and planets) as representing enemy monoplanes (Bartholomew 1989).

Island of Banda, Indonesia, 1937

During March 1937, the first Indonesian Prime Minister, Soetan Sjahrir, was living on the Moluccan island of Banda, where he described a head-hunting rumor-panic which swept through his village. The episode coincided with rumors that a *tjoelik* (someone who engages in head-hunting for the government) was operating in the area and searching for a head to be placed near a local jetty that was being rebuilt. According to tradition, government construction projects will soon crumble without such an offering. Sjahrir (1949) said that "people have been living in fear" and were "talking and whispering about it everywhere" (162), and after 7 P.M. the streets were nearly deserted. There were many reports of strange noises and sightings. Sjahrir stated: "Every morning there are new stories, generally about footsteps or voices, or a house that was bombarded with stones, or an attack on somebody by a *tjoelik* with a noose, or a cowboy lasso. Naturally, the person who was attacked got away from the *tjoelik* in a nick of time!" (164). Sjahrir described the scare as an example of "mass psychosis."

USA, 1938

On Halloween Eve 1938, a live fictional radio drama produced by Orson Welles was broadcast across much of the United States by the CBS Mercury Theatre. It depicted an invasion by Martians who had landed in Grovers Mill, New Jersey, and soon began attacking with heat rays and poison gas. Princeton University psychologist Hadley Cantril (1940) concluded that an estimated 1.2 million listeners became excited, frightened, or disturbed. However, subsequent reviews of Cantril's findings by sociologists David Miller (1985), William Sims Bainbridge (1987), and others, concluded that there was scant evidence of substantial or widespread panic. For instance, Miller found little evidence of mobilization, an essential ingredient in a panic. Hence, it was a collective delusion and not a true panic. Cantril also exaggerated the extent of the mobilization, attributing much of the typical activity at the time to the "panic." In short, many listeners may have expressed concern but did not do anything in response, like try to flee, grab a gun for protection, or barricade themselves inside a house. Either way one looks at this episode, it qualifies as a collective delusion. If, as Cantril originally asserted, many listeners were frightened and panicked, it is a mass delusion. Conversely, if we are to accept the more recent and likely assessments that

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the "panic" was primarily a media creation inadvertently fueled by Cantril's flawed study, then erroneous depictions of a mass panic that have been recounted in numerous books and articles for over six decades constitute an equally remarkable social delusion.

Mad Gasser of Mattoon, 1944

During the first two weeks of September 1944, residents of Mattoon, Illinois, were thrust into the world media spotlight after a series of imaginary gas attacks by a "phantom anesthetist." On Friday night, September 1, Mattoon police received a phone call that a woman and her daughter had been left nauseated and dizzy after being sprayed with a sweet-smelling gas by a mysterious figure lurking near their bedroom window. The woman also said she experienced slight, temporary difficulty in walking. Despite the ambiguous circumstances and lack of evidence, the following evening the incident was afforded sensational coverage in the *Mattoon Daily Journal-Gazette* ("Anesthetic Prowler on Loose"). After seeing the story, two other Mattoon families recounted for police similar "gas attacks" in their homes just prior to the incident.

Before the reports ceased (after September 12), police logged over two dozen separate calls involving at least twenty-nine victims, most of whom were females. University of Illinois researcher Donald Johnson (1945) investigated the episode, concluding that it was a case of mass hysteria. Their transient symptoms included nausea, vomiting, dry mouth, palpitations, difficulty walking, and in one instance, a burning sensation in the mouth. Given the influential role of the Mattoon news media, it may be that victims were redefining mundane symptoms such as a panic attack, chemical smell, one's leg "falling asleep," and the consequences of anxiety such as nausea, insomnia, shortness of breath, shakiness, dry mouth, dizziness, etc. as gasser-related.

"Miracle" in Puerto Rico, 1953

At 11 A.M. on May 25, 1953, an estimated 150,000 people converged on a well at Rincorn, Puerto Rico, to await the appearance of the Virgin Mary as predicted by seven local children. Over the next six hours, a team of sociologists led by Melvin Tumin and Arnold Feldman (1955) mingled in the crowd conducting interviews. During this period, some people reported seeing colored rings encircling the Sun, and a silhouette of the Virgin in the clouds, while others experienced healings, and a general sense of well-being. Others neither saw nor experienced anything extraordinary. A media frenzy preceded the event, and a local mayor enthusiastically organized the visionaries to lead throngs of pilgrims in mass prayers and processions. Tumin and Feldman found that the majority of pilgrims believed in the authenticity of the children's claim, and were seeking cures for conditions that physicians had deemed incurable. Various ambiguous objects in the immediate surroundings (clouds, trees, etc.) mirrored the hopeful and expectant religious state of mind of many participants.

Seattle Windshield Pitting Epidemic, 1954

On March 23, 1954, reports appeared in Seattle newspapers of damaged automobile windshields in a city eighty miles to the north. While initially suspecting vandals, the number of cases spread, causing growing concern. In time, reports of damaged windshields moved closer to Seattle. According to a study by Nahum Medalia of the Georgia Institute of Technology and Otto Larsen of the University of Washington (1958), by nightfall on April 14, the mysterious pits first reached the city, and by the end of the next day, weary police had answered 242 phone calls from concerned residents, reporting tiny pit marks on over 3,000 vehicles. In some cases, whole parking lots were reportedly affected. The reports quickly declined and ceased. On April 16 police logged forty-six pitting claims, and ten the

next day, after which no more reports were received.

The most common damage report involved claims that tiny pit marks grew into dime-sized bubbles embedded within the glass, leading to a folk theory that sandflea eggs had somehow been deposited in the glass and later hatched. The sudden presence of the "pits" created widespread anxiety as they were typically attributed to atomic fallout from hydrogen bomb tests that had been recently conducted in the Pacific and received saturation media publicity. At the height of the incident on the night of April 15, the Seattle mayor even sought emergency assistance from President Dwight Eisenhower.

In the wake of rumors of radioactive fallout and a few initial cases amplified in the media, residents began looking at, instead of through, their windshields. An analysis of the mysterious black, sooty grains that dotted many windshields was carried out at the Environmental Research Laboratory at the University of Washington. The material was identified as cenospheres—tiny particles produced by the incomplete combustion of bituminous coal. The particles had been a common feature of everyday life in Seattle, and could not pit or penetrate windshields.

Medalia and Larsen noted that because the pitting reports coincided with the H-Bomb tests, media publicity seems to have reduced tension about the possible consequences of the bomb tests—"something was bound to happen to us as a result of the H-bomb tests—windshields became pitted—it's happened—now that threat is over" (186). Secondly, the very act of phoning police and appeals by the mayor to the governor and even President of the United States "served to give people the sense that they were 'doing something' about the danger that threatened" (186).

Phantom Slasher of Taiwan, 1956

For a two-week period in 1956, residents in the vicinity of Taipei, Taiwan, lived in fear that they would be the next victim of a crazed villain who was prowling the city and slashing people at random with a razor or similar type weapon. At least twenty-one slashing victims were reported during this period, mostly women and children of low income and education. Norman Jacobs was teaching in Taipei at the time, and conducted a survey of local press coverage of the slasher. Jacobs concluded that those affected had erroneously attributed mundane slash marks to a dastardly slasher (Jacobs 1965).

Rumors amplified by sensational press coverage treating the slasher's existence as real served to foment the scare by altering the public's outlook to include the reality of a daring slasher. Police eventually concluded that the various "slashings" had resulted from inadvertent, everyday contact in public places, that ordinarily would have gone relatively unnoticed. For instance, one man told police in detail how he had been slashed by a man carrying a mysterious black bag. When a doctor determined that the wound was made by a blunt object and not a razor, the "victim" admitted that he could not recall exactly what had happened, but assumed that he had been slashed "because of all the talk going around." In another case, it was not the supposed victim but physicians who were responsible for creating an incident. An elderly man with a wrist laceration sought medical treatment but the attending doctor grew suspicious and contacted police when the man casually noted that a stranger had coincidentally touched him at about the same time when he first noticed the bleeding. A more thorough examination led to the conclusion that the "slash" was an old injury that had been re-opened after inadvertent scratching.

On May 12 police announced the results of their investigation: they concluded that the episode was entirely psychological in origin. Of the twenty-one slashing claims examined by their office, they determined that "five were innocent false reports, seven were self-inflicted cuts, eight were due to cuts other than razors, and one was a complete fantasy" (Jacobs, 1965, 324).

First Flying Saucer Wave, 1947

On June 24, 1947, Kenneth Arnold was piloting his private plane near the Cascade mountains in Washington state when he saw what appeared to be nine glittering objects flying in echelon-like formation near Mount Rainier. He kept the objects in sight for about three minutes before they traveled south over Mount Adams and were lost to view (Arnold 1950; Arnold and Palmer 1952; Gardner 1988; Clark 1998, 139–143).

Worried that he may have observed guided missiles from a foreign power, Arnold eventually flew to Pendleton, Oregon, where he tried reporting what he saw to the FBI office there. But the office was closed, so he went to the offices of *The East Oregonian* newspaper. After listening to Arnold's story, journalist Bill Bequette produced a report for the Associated Press. It is notable that at this point, Arnold had described the objects as crescent-shaped, referring only to their movement as "like a saucer would if you skipped it across the water" (Gardner 1957, 56; Story 1980, 25; Sachs 1980, 207–208). However, the Associated Press account describing Arnold's "saucers" appeared in over 150 newspapers.

The AP report filed by Bequette was the proto-article from which the term "flying saucer" was created by headline writers on June 25 and 26, 1947 (Strentz 1970). Of key import was Bequette's use of the term "saucer-like" in describing Arnold's sighting. Bequette's use of the word "saucer" provided a motif for the worldwide wave of flying saucer sightings during the summer of 1947, and other waves since. There are a few scattered historical references to disc-shaped objects, but no consistent pattern emerges until 1947, with Arnold's sighting. There have only been a handful of occasions prior to 1947 that a witness has actually used the word "saucer" to describe mysterious aerial objects. Hence, the global 1947 flying saucer wave can be regarded as a media-generated collective delusion unique to the twentieth century.

Zeitoun, Egypt, 1968–1971

From April 1968 to May 1971, more than 100,000 people reported observing Virgin Mary apparitions above a Coptic Orthodox Church at Zeitoun, Egypt. Witnesses' descriptions

varied between two main types: small bright, short-lived lights nicknamed "doves," and more enduring, less intense, diffuse patches of glowing light (Johnston 1980). Canadian neuropsychologist Michael Persinger of Laurentian University and his American colleague John Derr (1989) analyzed seismic activity in the region from 1958 to 1979, and found an unprecedented peak in earthquakes during 1969. They state that "The 'narrow' window of significant temporal relationship between luminous phenomena and earthquakes is within the classic time frame of more acceptable antecedents (e.g., microseismic activity) of imminent earthquake activity." It appears that the Marian observers were predisposed by religious background and social expectation to interpreting the light displays as related to the Virgin Mary.

The Hispanic Goatsucker, 1975 to Present

Between February and March 1975, reports circulated in Puerto Rico of a mysterious creature attacking domestic and farm animals, draining their blood and scooping out chunks of their flesh. Residents claimed that they heard loud screeches and/or flapping wings coinciding with the attacks. Academics and police examined the carcasses, blaming everything from humans to snakes to vampire bats. Locals referred to the attacker as "The Vampire of Moca." This incident may have been spurred by the better known "cattle mutilation mystery" (Ellis 1996, 3). In November 1995, similar attacks were reported on the island. Called *chupacabras* or goatsucker, (named after a crepuscular bird that steals goat's milk), the bizarre being was described as a "bristly, bulge-eyed rat with the hind legs of a kangaroo, capable of escaping after its crimes in high speed sprints" (Preston 1996). It also exuded a sulfur-like stench. Stories described the bodies of animals disemboweled and drained of blood. One member of a Civil Defense team in a small city in the affected area says he spends half his time responding to chupacabras calls. Some people, he reported, have been so distraught "that they have had to be taken to the hospital" (Navarro 1996). Interest in the creature ran so high in May 1996 that a *chupacabras* Web site received enough hits to be ranked in the top 5 percent of all Web sites (Ellis 1996, 2). By March 1996, goatsucker stories had spread to Hispanic communities in Florida; by May, accounts of *chupacabras* attacks began to circulate in Mexico and soon after, to the Mexican-American community in Arizona. The *chupacabras* flap ended abruptly in mid-1996, and almost nothing has been reported on it since.

Indonesian Borneo, 1979

For several weeks in late 1979, a kidnapping rumor-panic suddenly broke out on the island of Borneo. Anthropologist Richard Drake was studying the Mualang peoples living on the Belitang Hulu River in Kalimantan Barat when the episode broke out (Drake 1989). Soon guards were posted around the village, rubber tapping ceased, and a local school closed for insufficient attendance. A variety of ordinarily mundane events (such as noises and rustling in the jungle) and circumstances were defined as kidnapper-related. The scare was triggered by rumors that the government was constructing a bridge in the region and needed a body to place in the foundation to strengthen it. The episode is related to periodic kidnapping and headhunter scares in the region dating back to the seventeenth century coinciding with real or rumored government construction projects and a local belief that such developments require a head or body to be laid in the foundation or on a special pillar nearby to make for an enduring structure (Forth 1991; Barnes 1993). Drake argues that such episodes reflect antagonistic tribal-state relations characterized by distrust and suspicion of a distant, central government.

West Bank, Jordan, 1983

Between March and April 1983, 947 mostly female residents of the Israeli-occupied Jordan West Bank reported various psychogenic symptoms: fainting, headache, abdominal pain, and dizziness (Modan et al., 1983). The episode was precipitated by poison gas rumors and a long-standing Palestinian mistrust of Jews. The medical complaints appeared during a fifteen-day period, amid rumors and intense media publicity that poison gas was being sporadically targeted at Palestinians. The episode

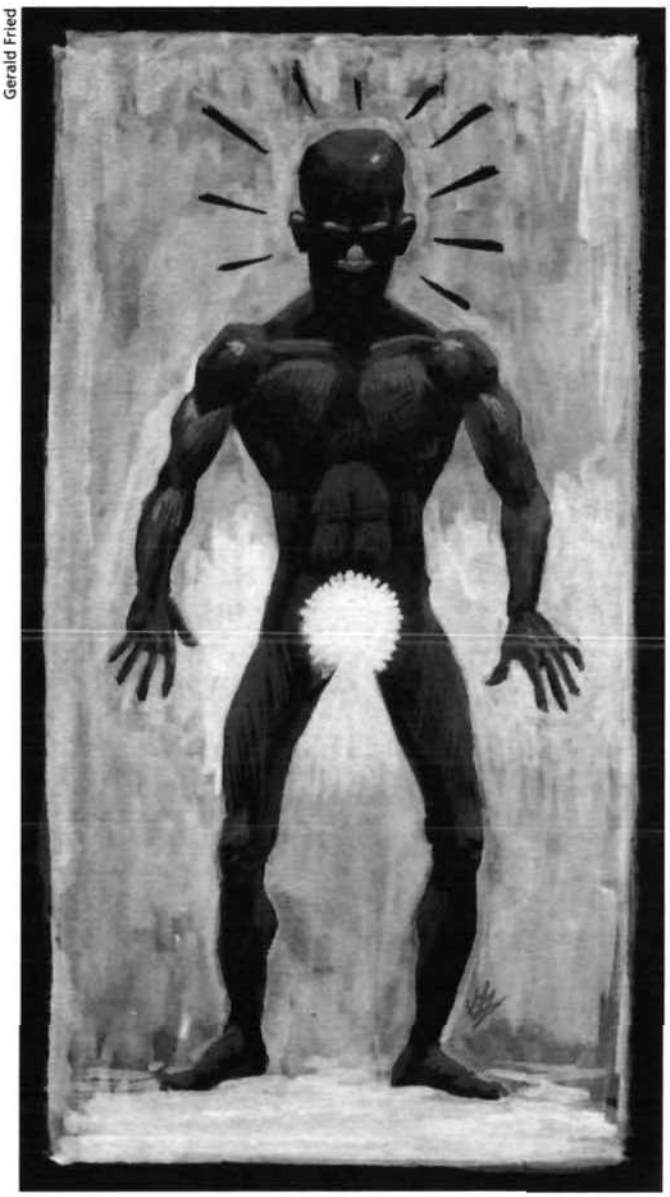
began in, and was predominantly confined to, schools in several adjacent villages. In one incident on March 27, sixty-four residents in Jenin were rushed for local medical care after believing that they had been poisoned when thick smoke belched from an apparently faulty exhaust system on a passing car. In all, 879 females were affected. Following negative medical tests, it became evident that no gassings had occurred, the hypothesis was discredited, and the transient symptoms rapidly ceased.

Mass Delusion by Proxy in Georgia, 1988

A rarely reported form of what could be described as mass delusion by proxy occurred at a Georgia elementary school near Atlanta in 1988. It involved the re-labelling of mundane symptoms that were instigated and maintained by erroneous beliefs among hypervigilant parents. The episode began during a routine social gathering of parents and students at the school cafeteria in early September. A student's mother commented that, ever since the term began, her child had experienced numerous minor health problems and looked pale. Other mothers at the meeting noted similar signs and symptoms in their children since the beginning of the school term: pallor, dark circles under the eyes, headaches, fatigue, nausea and occasional vomiting. They soon suspected that something in the school building was to blame, a view confirmed on October 11 when the school was evacuated after a minor natural gas leak occurred during routine maintenance. When intermittent minor gas leaks continued over the next month, concerned parents picketed the school and appealed to the local media, which highlighted their fears. After negative environmental and epidemiological studies, Philen et al. (1989) concluded that mothers had almost exclusively redefined common and everpresent childhood illnesses, while the children in question neither sought attention nor were overly concerned with their symptoms, maintaining high attendance levels throughout the term.

Kosovo, 1990

On March 14, 1990, at least four thousand residents in the Serbian province of Kosovo, in the former Yugoslavia, were struck down by a mystery illness that persisted for some three weeks. According to Dr. Zoran Radovanovic (1995), the head of the community medicine faculty at Kuwait University, the symptoms were psychogenic in nature and prompted by ethnic Albanian mistrust of Serbs. The transient complaints were almost exclusively confined to young adolescent ethnic Albanians, and included headache, dizziness, hyperventilation, weakness, burning sensations, cramps, chest pain, nausea, and dry mouth. The episode began at a high school in Podujevo, and rapidly spread to dozens of schools within the province. An outbreak of respiratory infection within a single class appears to have triggered fears that Serbs may have dispensed poison. Influential factors included rumors, the scrutinization of mundane odors and substances, visits by health authorities that served to legitimate fears, ethnic tension between Serbs and Albanians, and mass communication. The dramatic proliferation of cases across the province on March 22 coincided with the implementation of an emergency disaster plan whereby ethnic Albanians seized control of public health services.



Gerald Fried

Nigerian Genitalia Vanishing Epidemic of 1990

During 1990, an episode of "vanishing" genitalia caused widespread fear across Nigeria. Native psychiatrist Sunny Ilechukwu (1992) said that most reports of attacks involved male victims. Accusations were usually triggered by incidental body contact with a stranger in a public place, after which the "victim" would feel strange scrotum sensations and grab their genitals to confirm that they were still there. Then they would confront the person as a crowd would gather, accusing them of being a genital thief, before stripping naked to convince bystanders that their penis was really missing. Many "victims" claimed that the penis had been returned once the alarm had

been raised or that, although the penis was now back, "it was shrunken and so probably a 'wrong' one or just the ghost of a penis" (95). The accused was often threatened or beaten until the penis had been "fully restored," and in some instances, the accused was beaten to death. Ilechukwu (1992, 96) described the scene in one city:

> Men could be seen in the streets of Lagos holding on to their genitalia either openly or discreetly with their hands in their pockets. Women were also seen holding on to their breasts directly or discreetly by crossing the hands across the chest. It was thought that inattention and a weak will facilitated the "taking" of the penis or breasts. Vigilance and anticipatory aggression were thought to be good prophylaxis.

Social and cultural traditions contributed to the outbreak as many Nigerian ethnic groups "ascribe high potency to the external genitalia as ritual and magical objects to promote fecundity or material prosperity to the unscrupulous" (Ilechukwu 1988, 313). The belief in vanishing genitalia was not only plausible but institutionalized; many influential Nigerians expressed outrage when police released suspected genital thieves. A Christian priest even claimed that a Bible passage where Jesus asked "Who touched me?" because the "power had gone out of him," referred to genital stealing (101–102).

Concluding Remarks

The next one thousand years will yield a new batch of social delusions and hysterical outbreaks that will reflect the hopes and fears of future generations. While it is not possible to know the exact nature of these episodes, we can confidently predict one of the first delusions of this period. For at the start of the second Christian millennium, we should be mindful that the millennial notion is itself a social delusion. The concept does not exist in nature but is a human creation—a product of history and circumstance. It has no significance beyond the meaning that humans attach to it. Yet, students of history know well that the consequences of beliefs can enormously influence the course of history.

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Doomsday Fears at RHIC

This year, the Relativistic Heavy Ion Collider (RHIC) is poised to begin a program of cutting-edge nuclear science. Recently, alarmist journalism unnecessarily raised public fears about implausible doomsday scenarios associated with the machine.

THOMAS D. GUTIERREZ

The Relativistic Heavy Ion Collider (RHIC; pronounced "rick") is a 2.4-mile circumference collider at Brookhaven National Laboratory (BNL) on Long Island. The machine is scheduled to go online in May 2000 and is designed to, among other things, collide two gold nuclei, each with 197 nucleons (protons and neutrons), head-on at 99.995 percent the speed of light. This will allow physicists to study the quark-gluon plasma, along with a wide variety of nuclear properties. Such words can certainly spark the imagination, but what exactly are these scientists doing?

At just over 10^{-15} meters, fifty thousand times smaller than a typical atom, a gold nucleus is made of a soup of hundreds of nucleons which together act very much like a glob of

liquid. Each nucleon is an individually wrapped "bag" containing three objects known as quarks. In the bag, the quarks are bathed in a seething sea of energy fluctuations. The primary denizens of this sea, gluons, are responsible for mediating the strong nuclear force—the force holding the bag of quarks together.

Oddly, no free quark or gluon has ever been directly observed. Indeed, based on quantum chromodynamics (QCD), the theory governing the forces between quarks and gluons, we may *never* expect to see such objects. On everyday human scales, gluons and quarks interact so strongly and in such a peculiar way that they are forever hidden from direct observation through a process called confinement. However, vast and reliable *indirect* evidence for quarks and gluons has accumulated since the 1960s (Halzen 1984; Carrigan 1990; Close 1993; Icke 1995).

RHIC magnets, a view inside the RHIC ring tunnel. Photos courtesy of Brookhaven National Laboratory.

When RHIC slams together two nuclei at such fantastic speeds, one goal is to raise the temperature of the colliding nuclei to about a trillion degrees Celsius. At this temperature, nuclear matter undergoes a phase transition analogous to liquid water becoming a gas. The individual bags of nucleons within the nucleus boil away, unleashing the quarks and gluons trapped inside, creating a new state of nuclear matter known as a quark-gluon plasma (QGP).[1] The QGP acts as a single "giant" bag of confined quarks and gluons just a little bigger than the whole nucleus. Within 10^{-24} seconds the QGP will expand in a fireball, cool, then precipitate into a fantastic flurry of subatomic particles racing off to highly sophisticated detectors.

The Collider will give scientists insight into, among other things, the early moments of the universe. A millionth of a second or so after the Big Bang, our own universe began cooling not unlike the QGP fireball. However, at the beginning of time, the *whole universe* was steeped in a QGP. At RHIC, experimentalists are struggling to get a glimpse of just *two* nuclei undergoing a phase transition. In other words, the amount of matter and energy involved at the RHIC experiment is tiny by universal standards. The RHIC Web site notes that the total energy of the two colliding gold nuclei is only equal to about the energy of a mosquito hitting a screen door! Understanding the "smallness" of this experiment is important in addressing doomsday claims. Although the experiment is quite grand on a human scale, it is a far cry from "playing God."

The Doomsday Claims

In 1999, some segments of the media and the public fixated on several speculative doomsday scenarios at RHIC. How such claims began can be traced to a few articles in the popular press. However, there may have been latent confusion in the public regarding the science at RHIC that allowed the doomsday claims to easily take hold. One common doomsday scenario claimed that the violently colliding nuclei would create a mini-black hole which would swallow Earth and everything on it. Another scenario involved the creation of "strange matter" which, through a chain reaction, may go on to precipitate all "regular matter" into "strange matter," also destroying the world. These concerns have been directly and rationally addressed officially by the lab itself and unofficially by individual experts.

The mini-black hole scenario can be dismissed with simple physics arguments. There isn't enough matter or energy at RHIC to create a black hole. A back-of-the-envelope calculation demonstrates that RHIC lacks about thirty-six orders of magnitude in mass and energy to create a nucleus-sized black hole! With this heavy constraint, it is just about as likely that a black hole will randomly appear next to your head as you read this article. If a black hole were to be created with RHIC energies (using very generous assumptions), it would have to be around 10^{-38} meters in radius. Gravity expert Steven Carlip of the University of California at Davis has estimated that such a small black hole would harmlessly evaporate in about 10^{-90} seconds in a puff of Hawking radiation (Carlip 1999). Creating black holes at RHIC is not a realistic possibility.

Strange matter is a hypothesized form of matter that theoretical physicists have been pondering for a number of years. Nucleon bags contain three quarks in combinations of the two lightest varieties (out of six) known dryly as "up" and "down." The next heaviest quark is called "strange." Strange matter simply has more quarks of a wider variety per bag. A "strangelet" typically has six quarks in various combinations of up, down, and strange. The catch is that, although QCD

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doesn't eliminate strangelets as a possible configuration of quarks, no one has ever seen such objects in the lab.

According to some theorists there is a remote possibility that strangelets have a lower energy than conventional nuclear matter. After a string of highly unlikely possibilities, if lodged in a nucleus, not only could this object be stable, but the rest of the nucleus would reconfigure itself to be a strangelet too as it falls to the lowest possible energy configuration. In a chain reaction, these voracious strangelets could wander around converting every nucleus they touched into strange matter. Although the chain of events required is unlikely, the production of a hungry strangelet could create an unimaginable catastrophe. Scientists claim that such a situation is "highly unlikely." But how unlikely?

To put all doomsday notions to rest, we turn to cosmic rays. Cosmic rays include ubiquitous particles ranging in size from individual protons to large nuclei. There is a wide spectrum of energies associated with cosmic rays. Indeed, there are many cosmic ray collisions which are far more energetic than can be achieved in any laboratory, including RHIC. There are billions of RHIC-like events *per second* pounding into the Moon alone. This has been occurring over billions of years and each one is, in principle, capable of producing a strangelet or other catastrophe. With these natural statistics, no evidence of a voracious reaction has ever been observed on the Moon or elsewhere. This should be a convincing argument that experiments at RHIC won't herald doomsday.

In other words, RHIC isn't doing anything nature itself hasn't done repeatedly and more vigorously since nearly the beginning of time; scientists are just being more systematic on a very small scale. Indeed, if such things are possible at RHIC, we would have already seen evidence for black holes, strangelets, or other wild catastrophes from cosmic rays.

Broadly addressing the above concerns, physicist John Marburger, director of Brookhaven National Laboratory, has stated: "Possible dangerous consequences of RHIC collisions have been explored, analyzed, and laid to rest long ago by men and women who also have families and hopes for the future. No scientific experiment is worth risking the life of even one person, or the health of our environment. No one who is knowledgeable about the RHIC experiments believes such risks are present" (Marburger 1999a). Marburger asked Robert Jaffe of MIT to chair a scientific committee to officially investigate the doomsday issue. By the end of September, the committee published their scientific report "Review of Speculative 'Disaster Scenarios' at RHIC" (Jaffe 1999) which rigorously addressed the doomsday claims. The report concluded that RHIC operations are safe.

Generating Irrational Fear

The media's approach to RHIC has been quite varied. Most coverage of RHIC by the media has been positive. Many very objective and well-written articles have been published in preceding months (Boyle 1999; Browne 1999; Lane 1999; Rogers 1999; Matthews 1999; Mukerjee 1999; Suplee 1999). However, a few bad apples have spoiled things for everyone, sparking unnecessary fear and concern in the public regarding the safety of RHIC (Leake 1999; Moody 1999a). This has put BNL sharply on the defensive. Alarmist writers have done the journalistic equivalent of wantonly shouting "fire" in a crowded theater. These writers, often operating from nothing better than rumors and the words of crackpots, sparked a blizzard of panicked letters by concerned citizens as the word of "pending doomsday" spread.

In July 1999, *Scientific American* reported that a March article on RHIC by Madhusree Mukerjee entitled "A Little Big Bang" (Mukerjee 1999) "alarmed several readers" (Letters 1999). True to *Scientific American* style, the article itself provided a readable account of the activities at RHIC. Yet it prompted readers to openly speculate on the possibility of RHIC somehow altering "the underlying nature of things such that it cannot be restored" and creating miniature black holes. Another reader waxes that he is "concerned that physicists are boldly going where it may be unsafe to go." How such fears were spawned before this article is unclear.

Also in July, Jonathan Leake of the *Sunday Times* of London wrote an article simply entitled "Big Bang Machine Could Destroy Earth" (Leake 1999). The article goes on to rationally describe the goals of the experiment and outlines some of the details of the science involved. On the whole, the short article is rather informative. However, interspersed amongst the fairly calm and rational text are spikes of unqualified alarmist rhetoric. The sensationalist title of Leake's piece betrays his underlying premise: the machine is dangerous. The "could" in the title, from a journalistic point of view, is essentially superfluous. The piece ends by quoting a leading British scientist: "The big question is whether the planet will disappear in the twinkling of an eye. It is astonishingly unlikely that there is any risk—but I could not prove it."

In September, Fred Moody wrote a short online opinion piece for ABCNEWS.com entitled "Atlas Shrugs" (Moody 1999a). Moody's past articles demonstrate that he is quite educated in a whole host of technology subcultures. However, the article is the most incendiary and blatantly irresponsible piece of journalism yet published on RHIC safety issues. A few weeks after his original article, Moody published an apologetic follow-up piece that chided scientists for not having a sense of humor (Moody 1999b). However, the damage had already been done.

Moody's piece starts with a quote: "If scientists can be counted on for anything, it's for creating unintended consequences." The article's summary box glibly states, "The hubris of trying to replicate the universe just after the Big Bang could have catastrophic consequences." From here the piece introduces us to Moody's friend, David Melville, "an eccentric physicist and thinker" who writes Moody a "panicky e-mail" admitting that he is "preoccupied" with the RHIC experiments, "the most dangerous event in human history." At one point (it was later removed), in the margins, there was an

informal online poll asking the loaded question, "Should potentially dangerous experiments, like the one at Brookhaven, be allowed to proceed [yes or no]?" Melville claims, "It has been theorized by Steven Hawking that from this quark-gluon plasma other forms of matter are also produced. The most dangerous being a black hole." Hawking's honest, but comically wry, response: "I never said that. Long Island is quite safe" (BNL 1999).

Moody elaborates on the various doomsday scenarios already discussed, liberally adding his friend's personal scientific theories and viewpoints. Moody then goes on to speculate that "Sagan considered nuclear war the likeliest cause of destruction [of an advanced civilization], but the creation of an annihilating black hole is more plausible. Not only does it explain the apparent absence of life anywhere else in the universe, it also explains the absence of any past civilizations." Creating a black hole in the lab is more likely than nuclear holocaust? This is just a small sampling of Moody's irresponsible journalism. Keep in mind this is coming from the technology section of ABCNEWS.com, a major online news source! It is not surprising that, after the Moody article, public fears began to rise above the apparently preexisting din of quacks and alarmists. Within several weeks of the article's publication, President Clinton asked to be briefed on the safety issues at RHIC. In a matter of a few months, the system cascaded from a few random alarmist letters in *Scientific American* to scientists briefing the President of the United States on science fiction doomsday scenarios.

Aerial view of Brookhaven National Laboratory with the RHIC ring in the background.

Discussion

The two articles mentioned above, along with the alarmist public letters, play off of a number of fairly devious misinformation techniques and argumentative fallacies. They are designed to highlight the "reality" of the doomsday scenarios: appealing to authority, playing off of public mistrust of science, misrepresenting complicated scientific ideas, masking irrationality in a package of rationality—the list goes on. Alas, for every ounce of misinformation, it seems to take a pound of clarity to undo the damage. So what can be done?

On one level, the answer is obvious: scientists, members of the media, and the public, using open lines of communication, need to work together to combat ignorance. However, the tension between the three sectors is clear. One can't help but wonder if the public and the media perceive scientists to be so righteous and arrogant that, out of spite, they simply *want* them to be wrong. And let's face it, some scientists clearly enjoy the wall of mystique and complexity surrounding their fields of expertise.

Personality conflicts aside, if a member of the public reads an article from a major news source that quotes experts who claim doomsday is nigh, this *should* be a cause for rational alarm. Public safety is clearly important. However, individuals should act responsibly on such concerns. People have a right to demand accurate media reporting, but they also have a right to demand clear and unpretentious explanations directly from experts—especially when safety is a concern. Physicist Daniel Cebra, director of the Nuclear Group at the University of California at Davis, and active member in the RHIC project at BNL, personally phoned a number of openly worried members of his small community to calm fears after seeing their letters in the local paper. These individuals demanded a response from an expert and got it. This kind of outreach can only improve the relationship between the public and the scientific community.

However, if a scientist generates a media event by using phrases that are flippant, "brutally frank," or unintentionally alarmist, they probably need to rephrase themselves to match the language of their listeners. Mismatches between colloquial and technical language are at the source of much turmoil between science and the media. For example, scientists often speak differently from nonscientists when it comes to assessing degrees of probability. When expressing a "scientific opinion," without the direct benefit of experiment, most scientists are open to possibilities and enjoy using their imaginations as much as anyone else. A priori, truly unquestionably impossible things are indeed rare. If one discovers something that is really absolutely impossible, that's important and you remember it. Everything else can be categorized in varying degrees of possibility ranging over many orders of magnitude between probability equals zero and one. Considerable room for smallness exists between those two numbers. There is an art to assessing such probabilities responsibly and appreciating "effective impossibility" when you see it. But there is also an art, which many scientists seem to lack, to expressing impossibility to nonscientists; scientists feel guilty saying something is unquestioningly impossible. Consequently, ask a scientist if

something is "possible" you may be asking for trouble. Be prepared to have all of your fears and fantasies confirmed with a heavily qualified "yes, but. . . ."

In turn, scientists should expect the public and the media to be able to apply basic critical thinking skills in order to process important information. Complex and heavily qualified answers from scientists are usually not the forte of the public nor the media. Shades of possibility are generally ignored. Depending on the audience, events tend to be divided sharply between two choices: "possible" and impossible. In our cynical culture, raised on Murphy's Law, many interpret the word "possible" to mean "if the outcome is bad, it will happen; if the outcome is good, it won't." Many responsible attempts of scientists to explain themselves are usually met with—ironically—skepticism. However, this is often not skepticism fueled by rationality, healthy curiosity, or wizened expertise. It is reactionary, jaded skepticism applied too broadly and too haphazardly. Often, in the eyes of the media and, by proxy, the public, explanations or "rationalizations" are interpreted as signs that someone is avoiding the truth. One should not ignore stated facts simply because someone is explaining herself! If a listener has questions and an expert is giving a point-by-point response, it is probably in the listener's best interest to pay close attention.

Over the past several months, Jack Marburger, Daniel Cebra, and many other scientists have done an excellent job in clarifying and calming the brewing fears surrounding RHIC. Indeed, the scientific community has learned some valuable and humbling lessons in public relations from this experience. In turn, the media have largely responded responsibly, often rallying to the defense of RHIC and calling for rationality in the thick of what seemed like thundering public irrationality. Finally, the public, other than a few extremists, have demonstrated that they still trust science but want to hold it accountable; on the whole, people *are* paying attention and *do* care about *what scientists are doing*.

Rationality seems to have prevailed for now; it has withstood the onslaught of a modern mania. Although we must all be ever-vigilant to stem the growth of irrationality, this exercise alludes to a rather encouraging future where science, the media, and the public ultimately work together for a more intellectually responsible society.

Note

1. Scientists at CERN in Geneva, Switzerland, have recently announced the exciting discovery of a new state of nuclear matter (CERN 2000). Technically, they are claiming evidence for what is called "quark-gluon matter." Most regard quark-gluon matter to be a state whereby only a portion of the collision region between the two nuclei shows evidence of quark deconfinement. This is not quite the same as a quark-gluon plasma.

The term *quark-gluon plasma* is usually reserved for a similar, but more specialized, thermodynamic condition whereby most or all of the quarks and gluons amongst the two nuclei are deconfined. In other words, a quark-gluon plasma is a special type of quark-gluon matter and has yet to be discovered. RHIC, with energies about ten times those currently available at CERN, is positioned for further study of quark-gluon matter and the discovery of the quark-gluon plasma.

Also, it should be noted that although quarks and gluons become deconfined in a small region around the reaction, this in no way implies that free quarks are directly seen in the laboratory. Evidence for quarks and gluons is, and possibly shall forever remain, only accessible through indirect measurement. This appears to be a fundamental consequence of the very non-intuitive and complex forces which operate between these objects.

Professor Luciano Maiani, CERN Director General, said: "The combined data coming from the seven experiments on CERN's Heavy Ion program have given a clear picture of a new state of matter. This result verifies an important prediction of the present theory of fundamental forces between quarks. It is also an important step forward in the understanding of the early evolution of the universe. We now have evidence of a new state of matter where quarks and gluons are not confined. There is still an entirely new territory to be explored concerning the physical properties of quark-gluon matter. The challenge now passes to the Relativistic Heavy Ion Collider at the Brookhaven National Laboratory and later to CERN's Large Hadron Collider."

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altair.ucdavis.edu/rhic.html—This Web site was compiled by Jennifer Klay, a graduate student in the Nuclear Group at the University of California, Davis. The site outlines the ongoing debate regarding the safety of RHIC operations. It also provides many useful links to the major articles mentioned in this piece.

www.rhic.bnl.gov—This is the official RHIC Web site.

www.bnl.gov—This is the official Brookhaven National Laboratory Web site. □

Save Our Science

The Struggle for Reason at the University

Astrology, parapsychology, and other "paranormal" phenomena are fashionable. Can we understand why? And what specifically should be done? At the University of Nice, France, an experiment is based on teaching the scientific method through examining the pseudosciences.

HENRI BROCH

In France, paranormal beliefs are thriving and the situation is becoming alarming. Figure 1 shows the results of a survey I conducted among university students on the scientific value of metal bending by mind power compared to relativistic dilation of time (taught to these same students). Mind-induced spoon bending is claimed to be a *scientific fact* by about seven students out of ten, and for more than a half of these students dilation of time is a *pure theoretical speculation*!

These shocking data were not the result of some local context or ambiguous formulation of the questions. They were statistically significant, and nationwide investigations conducted by professional pollsters produced similar results.

H. Broch inquiry, 1982-83
University of Nice. First Scientific stage
(Deug A1, B1 et A2)

Percentage of those who believe that each phenomenon is	"Mind induced spoon bending"	"Relativistic dilation of time"
Scientifically proven, a scientific fact	(68)	18
Recognized as acceptable, plausible	14	18
Unlikely	15	7
Pure theoretical speculation	0	(52)
Completely invalidated	3	5

Figure 1. Results of an investigation made among more than 300 university students on the scientific support they give to proposals concerning "metal bending by mind power" and the "relativistic dilation of time" (in an inquiry "psychokinesis versus relativity").

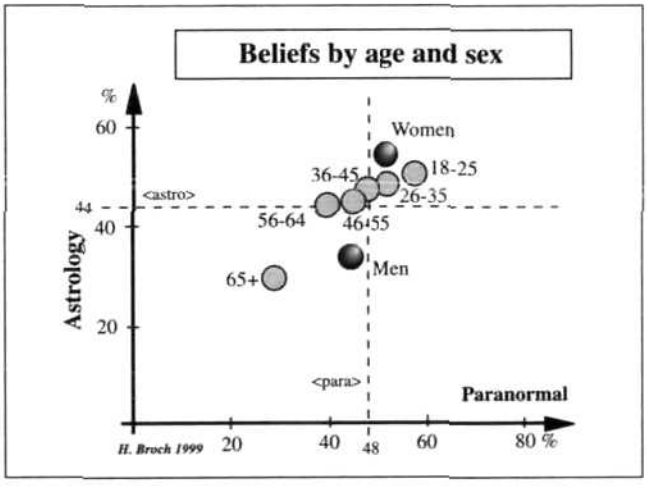

Figure 2. The level of belief in astrology and the paranormal versus age and sex among French people. Data from nationwide investigations made by professional pollsters; <astro> and <para> represent the mean values.

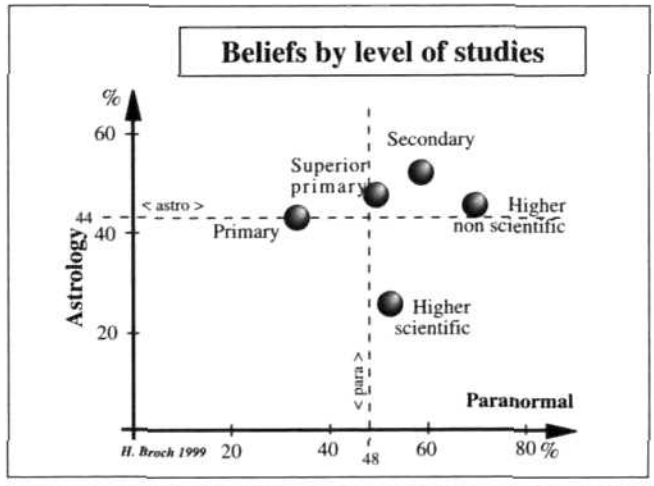

Figure 3. The level of belief in astrology and the paranormal versus the level of studies among the French. Data from nationwide investigations made by professional pollsters; <astro> and <para> represent the mean values.

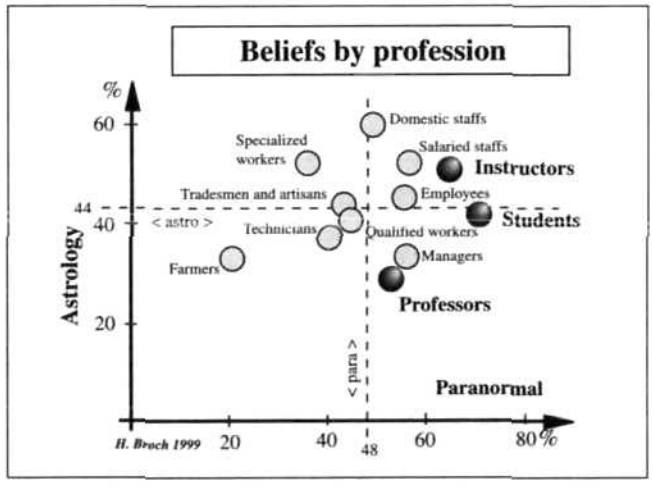

Figure 4. The level of belief in astrology and the paranormal versus the socio-professional categories among the French. Note the level of belief in the education world (primary school teachers, students, and professors). Data from nationwide investigations made by professional pollsters; <astro> and <para> represent the mean values.

Figure 2 shows some surprising aspects, based on an investigation (by two sociologists, in 1986) of belief in astrology and the paranormal among the French.

The level of belief *decreases* almost continuously with aging, and, as widely asserted previously, a disparity between men and women is clearly confirmed, at least for astrology.

Contrary to what might be expected, the level of belief in the paranormal is *directly* proportional to the level of education (figure 3). Those with higher scientific degrees fare slightly better concerning astrology, although their level of belief in the paranormal is higher than the average.

Concerning professional categories, the group having the strongest belief in both astrology and the paranormal (figure 4) is primary school teachers ("instructors" on the graph)! Sadly enough, professors are stronger believers in the paranormal than the average French. Their belief in astrology, although "low," is still close to 30 percent. Rather surprisingly, people in the education world, students and teachers alike, are strong believers in the paranormal.

The situation has seen no improvement since 1986. In fact, more recent data confirm this dramatic trend. Obscurantism is experiencing an unprecedented diffusion. Yet, in an apparent paradox, the corpus of paranormal phenomena expands neither in quantity nor in quality. On the contrary, its sphere is shrinking, and no witches roam the skies on their brooms anymore. To illustrate this, figure 5 shows the decrease of reported psychokinetic power over time.

So-called "mana" was supposed to have moved the multiton statues of Easter Island centuries ago. Around 1850 the same power was claimed to be responsible when heavy tables "danced." A few decades ago the very same power could move a pan. By the 1970s we are down to small objects, such as a chess piece. Psychic power could nowadays displace a one-gram piece of paper! The alleged powers of psychokinesis have decreased by a factor of a million in the course of time, as the means of control and scrutiny get more sophisticated. This trend is also found in other types of psychic phenomena.

This paradoxical situation, i.e., the strong *increase* in belief versus the marked *decrease* of the number and intensity of the alleged phenomena, has several explanations.

- **The electronic media resonance effect**
  Information regarding psychic events is broadly disseminated at an unprecedented rate. For example, a haunted house would have remained a local event in earlier times, while in the nineties

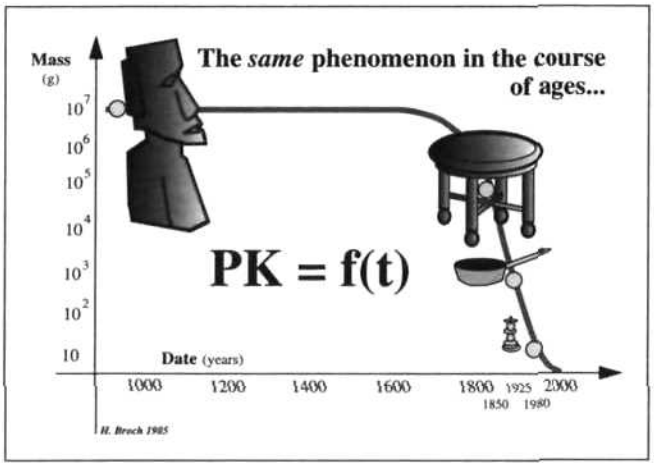

Figure 5. The decrease—by a factor of a million—of the reputed psychokinetic power "intensity" (the displaced masses) in relation with time. This trend can be found in any other type of psychic phenomena.

the "poltergeist-ing" of a Belgian country house became news worldwide through both Superchannel and CNN.

- **"Media lies" and the deontology drift**
  "Media lies" are commonplace in both mainstream programs and those devoted to the paranormal. Too many members of the media do not hesitate to sacrifice truth on the altar of audience ratings.

- **Transmission by educators**
  The teaching world is all too often the communication channel of beliefs. Stunning as it may seem, pupils in four classes in a public college in the south of France were sorted out according to astrological criteria. This was done for three years, until 1995, with the agreement of the whole pedagogic team.
  Another sad example is given by the French Teachers Mutual Purchase Cooperative. Its October 1986 catalog presented a Cheops wine-maturing accelerator that is a replica of the Cheops pyramid. The catalog claimed to have "officially controlled" that you obtain the equivalent of three years of wine maturation in only five weeks by the power of the pyramid concentrating the "shape waves"!

- **A change in knowledge transfer**
  The actual change in the process by which knowledge is acquired could provide a fourth explanation. The transfer of information is characterized by the proliferation of visual images and by immediate sensations, both detrimental to the value of the written symbol and of supported analysis.
  Text, the written symbol, allows detailed, constructed, critical analysis; it can be available for years or centuries, while contemporary media lends itself to superficial, transient messages. The written word, along with supported analysis, is being replaced by the visual image and immediate impression. This leads to an insidious and progressive *replacement of reason by emotion.*

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What Should Be Done?

Correcting the problems caused by pseudoscience is both a social and a professional responsibility. In this struggle for reason, it is necessary to use concepts or rules usable in practice. What would be the purpose of a solely discursive power or knowledge, with no operative capacity? With this in mind, we have to be careful not to lose contact with reality. The roles of observation and experimentation are fundamental. This is especially true in our society where all too often one teaches the results of science instead of explaining the manner in which these results have been obtained.

To be really efficient, a researcher has to have some Zetetics rules in mind. Zetetics is the "method used to penetrate the reason and the nature of things." Taught since antiquity, Zetetics is in fact the refusal of all dogmatic affirmation. I summarized it as the "art of doubt."

In 1993–94, at the University of Nice-Sophia Antipolis, I started a Zetetics course, "Paranormal Phenomena and Scientific Methodology." This course, under the patronage of the Physics Department, is a transdisciplinary option proposed to any student in his first year in general science studies. It seems to fill a need: more than 1,500 students have registered in six years.

The teaching is composed of two sections, the course and the practicals. The course includes audiovisual sessions on various themes (for a total of twenty-six hours by year and by student). It is divided into three parts.

1. Claimed "facts." Explanation and analysis of the *substance*

This part concerns the analysis of the *substance* of the claimed facts concerning various paranormal fields (astrology, spatial archaeology, miraculous and supernatural manifestations, and psi powers). For each field the results of a scientific investigation are given and analyzed.

2. Claimed "facts." Reflection and analysis of the *form*

In this part I develop an approach to the same subjects but this time emphasize the *form* instead of the substance. This is done with two aims: to cast light on the media lies via their various "techniques" and also to show that a more mathematical analysis can provide important information concerning the credibility of an allegation.

3. Paranormal and Science. Shaping of the *methodology*

This part examines general questions such as: Are sciences, nonsciences, and pseudosciences equal cognitive fields? How

can we define a science? This part is dedicated to the shaping of the essential approach for an hypothesis to qualify as being scientific.

The directed works, the practicals, constitute the second part of the teaching (varying from ten to 200 hours by year and by group of students, but in fact with no limit). This part covers the analysis of experiments done directly "in the field" by small groups of students on a subject of their choice. The themes cover the entire field of paranormal phenomena, *from magnetism and* dowsing to Megalithic monuments and out-of-body experiences. At the end of the year, the students are assessed on the complete report they make on their experimentation. Students have their choice of forms for their reports: paper, slides, audio or video tapes, CD-ROM, Web sites, etc.

Duplicating the Rocard experiment

presented in *"L'Homme et le Milligauss,"* 1986, and *"La Science & les Sourciers,"* 1989
according to Y. Rocard, **80%** of the population possess the dowsing reaction

Power (o = on ; n = off)											*Pendulum (+ = reaction; − = no reaction)*										
Pierrette (65 years old)	o	n	n	n	o	o	n	o	o	n	Patricia (17)	o	n	o	o	n	o	n	o	n	n
	+	+	-	-	+	-	+	-	+	-		-	-	-	-	+	-	-	+	-	-
Yves (42)	o	n	n	o	n	o	n	o	n	o	Franco (46)	o	o	o	n	o	o	n	n	n	n
	+	-	-	-	-	-	+	+	-	+		+	-	-	+	-	+	-	-	-	+
Julie (20)	n	n	n	o	o	n	o	o	n	o	Claudette (47)	n	n	n	o	o	o	n	o	n	o
	-	-	-	-	-	-	+	-	-	-		+	+	-	-	-	+	-	-	+	-
Andréa (19)	o	o	o	n	n	n	o	n	o	n	Céline (16)	o	o	o	n	o	n	n	n	o	n
	+	-	-	-	+	-	+	-	-	-		-	-	-	+	+	-	-	+	+	-
Christophe (23)	n	o	n	o	n	n	o	n	o	o	Stéphanie (19)	n	o	n	o	n	n	o	n	o	o
	-	+	-	-	+	+	-	-	-	-		-	-	-	-	-	-	-	+	-	-
Pierre (36)	o	n	n	o	o	n	o	n	n	o	Jean-Pierre (45)	n	o	o	o	n	n	n	o	n	o
	-	-	-	-	+	-	-	+	-	-		-	-	+	-	-	-	+	-	-	+
Catherine (42)	o	n	o	o	n	o	n	o	n	n	Francine (38)	n	o	o	n	n	o	o	o	n	o
	-	-	-	-	-	-	-	-	+	+		+	-	-	+	-	-	-	+	-	-
Patrick (33)	o	o	n	n	n	o	n	o	o	n	Laurent (19)	o	n	o	o	n	n	n	o	n	o
	+	-	-	-	+	+	-	+	-	-		+	-	-	-	+	-	-	-	+	-
Bill (25)	o	n	n	o	o	n	o	o	n	n	Sébastien (18)	o	o	n	n	o	n	n	o	n	o
	-	-	-	-	-	+	-	-	-	+		+	-	-	-	+	-	-	-	+	-
Aline (18)	o	n	n	o	n	o	n	n	o	o	Patricia (19)	n	n	o	o	n	n	o	o	n	o
	-	-	+	-	-	+	+	-	-	+		-	-	-	-	+	+	-	-	-	-

S. Pean, E. Porcaro, T. Pringot, S. Raty, P. Wainman, "Les Sourciers," SB1 report of Zetetics 1994-95

100 successes / **200** trials Reaction: 28% with the magnetic field ...
27% ***without*** **the magnetic field!**

33 people, 6 trial/head, double blind, direction of the current, right or left-handed person, sex, "parallel" or "transverse" oscillations, number of oscillations before rotation, sense of rotation...
V. Rousseau, T. El Souss, "Le secret des Sourciers," Master in Physics report of Zetetics 1998-99

93 successes / **198** trials Reaction: 30% with the magnetic field ...
36% ***without*** **the magnetic field !**

H. Broch 1999

Figure 6. Results obtained by Zetetics students having duplicated Rocard's experiment on the dowsing reaction. The upper part shows some details of the results obtained by a group of students (first year of Biological Sciences, 1994–95). Power "on" means that the electric current was circulating in the solenoid (see text) and pendulum "reaction" means that the pendulum, held in hand by the subject, rotates. The other part shows the global result—this experiment has taken into account a lot of parameters—obtained by two students (Master in Physics, 1998–99).

Here are some examples of reports:

- A group of students constructed a drawing visible from the sky using the techniques of the Peruvian Nazca people.
- Two girls made a statue that cries after two hours of prayers.
- Others students investigated the experiments on dowsing published by the physicist Yves Rocard. Professor Rocard was studying the detection of weak magnetic fields gradients by people using a pendulum and a specially designed electric sole (a sole with a small solenoid inducing a magnetic field in the heel of the subject). Figure 6 shows some results obtained by students attempting to duplicate the Rocard experiment.

  Without going into detail about the results, we can say that the double-blind technique (*not* adopted by Rocard) leads to the conclusion that dowsing ability does not exist in the studied population.

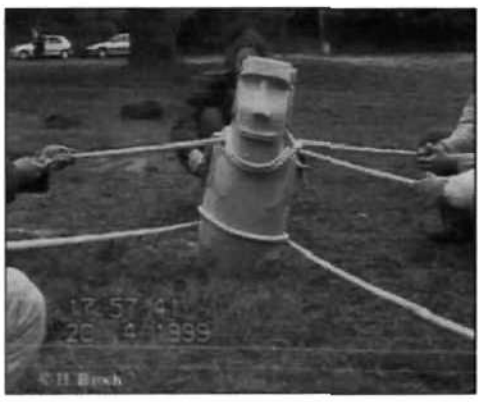

Figure 7. Test using a reduced-scale specially designed concrete statue. The test was conducted on the campus of the Faculty of Sciences, Nice, by Zetetics students working on the various displacement hypotheses for the Easter Island statues. Excerpt from videotape.

- Other students made a non-faked video showing a young boy levitating and tested the public reaction when their film was viewed.
- Another group examined fakir claims concerning the bed of nails (a young girl presented her "extraordinary" powers).
- Three students examined various hypotheses for moving and erecting the Easter Island statues.

  As figure 7 shows, they used a specially designed, reduced-scale statue and tested both the "sledge and oscillating trestle" and the "rotation with guying rolling gait" hypotheses.
- A study of the system used in the movie *Stargate* to position the destination planet.
- The possibility of subliminal video and audio messages.
- UFOs and various evidence-faking techniques.

Currently over 450 reports have been made. How can we encourage students to undertake such experiments and to adopt a scientific approach to a given problem?

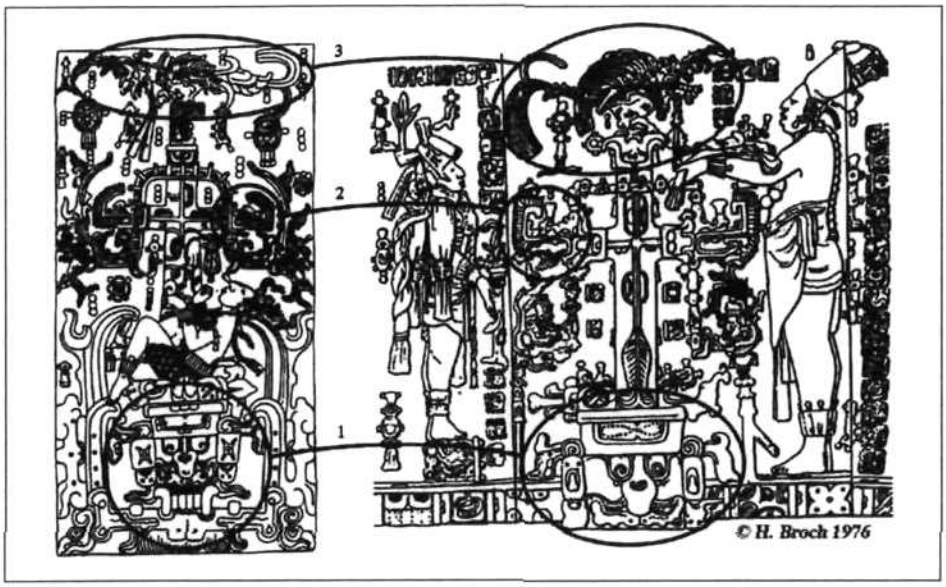

Figure 8. On the left: sculpture of the Mayan "Temple of Inscriptions" in Palenque, Mexico, claimed to represent a Mayan astronaut piloting a spaceship. Right: a sculpture in the neighboring "Temple of the Cross" in the same archaeological site. In 1 of figure 8: the mask of the "earth monster," symbol of death; In 2: a part of the Mayan sacred plant: the maize (corn); In 3: the "quetzal," the sacred bird of the Maya, symbol of the Sun, of life. The allegation of the Mayan astronaut originates from a French author in Nice in 1966 (for all the details, see H. Broch 1976 *La mystérieuse pyramide de Falicon* Paris: éd. France-Empire and H. Broch 1985, Le Paranormal. Paris: éd. Le Seuil).

Facets and Effects of Zetetics

It is necessary to present the scientific methodology not only in an attractive form but also in an easily memorizable one. This is the specific objective of the course using sections I call "Facets" and "Effects." Here are a few of the numerous Facets (with short chapter titles, making them easy to memorize) presented in the course:

- Nature is reliable.
- Quantity is not quality.
- Competitive is not necessarily contradictory.
- Inference is necessary.
- The burden of proof belongs on he who declares.
- To err is human, permanent fallibility is not.
- An extraordinary allegation needs a more than ordinary proof.
- The source of information is fundamental.
- A scientific theory can be tested.

In the course, each facet is detailed and illustrated. For example:

Figure 9. The most probable process for making a "Shroud of Turin." A wet linen is placed on a bas relief (the bas relief here was made by Médard de Chardon, one of my Zetetics students) and, after drying, the daubing is made using a pad with red ocher pigments and bone or skin glue solution as binding agent.

Context is important

The context of a claim or phenomenon always has to be taken into account. Often it allows the student to choose between different hypotheses. An example: After four excavation campaigns at the Temple of Inscriptions of the Mayan archaeological site in Palenque, Mexico, archaeologist Ruz Lhuillier discovered an internal crypt containing a sarcophagus in 1952. The cover of this sarcophagus was sculpted, and many magazines claimed that the sculpture represents a Mayan astronaut piloting a spaceship. In context, the solution is easy. It is sufficient to compare the "Mayan astronaut" with another sculpture in the neighboring Temple of the Cross in the *same* Palenque site (figure 8). The "astronaut" is a dead or sacrificed person on the altar, giving his life for the prosperity of the community.

Alternatives are fruitful

One of the most powerful skeptical tools is the alternative. This consists simply of asking the question, "Is there another explanation that gives an identical result, in the same conditions and with the same characteristics?"

Confronted with a "paranormal" phenomenon, the student could discover that the same result can be obtained by normal means. Then, the natural method is supported and the psychic or supernatural hypothesis becomes superfluous.

The Shroud of Turin, for example is often presented as not having been made by human hands. It has been—historically and physically—proven to originate from fourteenth century France and was probably made by the simple technique of daubing on a bas relief.

With the same ingredients, I demonstrate how to reproduce "shrouds" with all the characteristics attributed to the Turin one, including the three-dimensional effect (figure 9). (By the way, the first to describe the process and to realize the experiment on a bas relief was the Frenchman M. Clément, fellow of the Société Nationale des Beaux Arts, at the very beginning of the twentieth century.)

Some facets of Zetetics are especially important when applied to paranormal claims, and for this reason I refer to them as "effects" and name them for easier memorization. The "Escalation effect," the "Bi-standard effect," the "Rivulet effect," the "Biped effect," and the "Snowball effect" are among them.

I have no place here to give details. If you want to discover, among others, the "Doormat effect" (the most memorizable one for the students), which allows me to predict the six winning numbers of the French Lotto more than twenty-four hours in advance, please see the Proceedings of the Tenth Euro Skeptics Maastricht Congress.

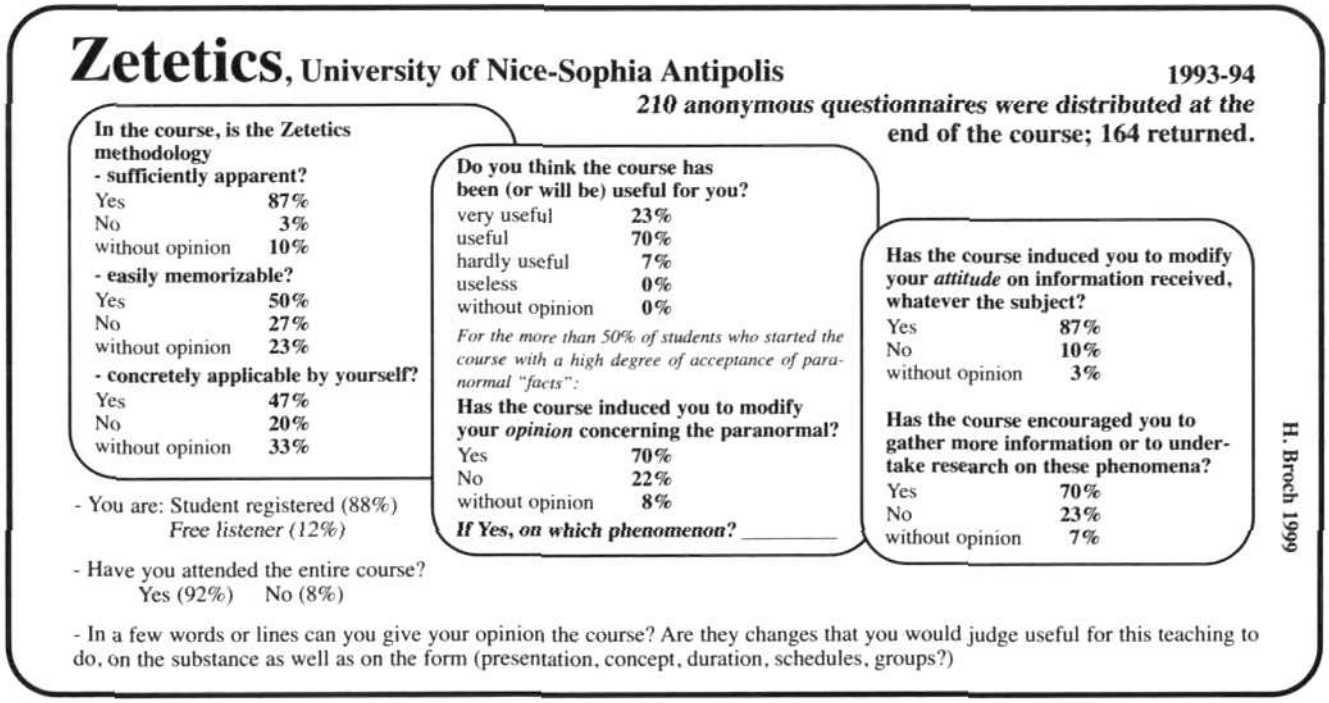
Zetetics, University of Nice-Sophia Antipolis
1993-94
210 anonymous questionnaires were distributed at the end of the course; 164 returned.
In the course, is the Zetetics methodology
- sufficiently apparent?
Yes 87%
No 3%
without opinion 10%
- easily memorizable?
Yes 50%
No 27%
without opinion 23%
- concretely applicable by yourself?
Yes 47%
No 20%
without opinion 33%
Do you think the course has been (or will be) useful for you?
very useful 23%
useful 70%
hardly useful 7%
useless 0%
without opinion 0%
For the more than 50% of students who started the course with a high degree of acceptance of paranormal "facts":
Has the course induced you to modify your opinion concerning the paranormal?
Yes 70%
No 22%
without opinion 8%
If Yes, on which phenomenon? _____
Has the course induced you to modify your attitude on information received, whatever the subject?
Yes 87%
No 10%
without opinion 3%
Has the course encouraged you to gather more information or to undertake research on these phenomena?
Yes 70%
No 23%
without opinion 7%
H. Broch 1999
- You are: Student registered (88%)
Free listener (12%)
- Have you attended the entire course?
Yes (92%) No (8%)
- In a few words or lines can you give your opinion the course? Are they changes that you would judge useful for this teaching to do, on the substance as well as on the form (presentation, concept, duration, schedules, groups?)

Figure 10. The opinion of Zetetics students. Results of anonymous questionnaires distributed at the end of the first year of the Zetetics course.

Conclusion

After six years of teaching this course, 1,523 students have registered. About 28 percent have quit, leaving 1,091 students presenting the examination, and, of this number, 845 have succeeded. We have a 77 percent success rate if we consider the *students presenting the final exam or 55 percent versus the* original registered students number.

What about the effects of the course? I think it is too soon to determine the full impact. Maybe it takes about ten years for the students to become actively involved and to intervene in various fields, hopefully diffusing the methodology they have learned.

The lasting impacts of such teaching may be delayed. As an example, one of my former Zetetics students has decided to reinvestigate the Rocard dowsing experiments. This work was done within the framework of a master's degree in physics. He is now spreading a critical, Zetetic, approach toward dowsing and magnetic fields among teachers in physics.

Using anonymous questionnaires distributed at the end of the course, feedback was obtained on the efficacy of this course. Figure 10 shows some data obtained at the end of the first year of the teaching.

More than nine out of ten students think that the course has been (or will be) useful or very useful to them. This is encouraging. We observe a clear change as 70 percent of these students have modified their opinion on this matter. More important, about nine out of ten declared that the course has induced them to *modify their attitude* on received information, *whatever* the subject.

Another very recent result of the course stems from the creation of the first Zetetics Laboratory in a French university. The lab was created in 1998 thanks to the grant of our Belgian colleague Jacques Theodor. The explicit objectives are the analysis of "paranormal" phenomena as well as prophylactic measures vis-à-vis the pseudosciences and diffusion of scientific methodology.

The lab Web site (www.unice.fr/zetetique/) describes, among other things, the teaching program and presents the international challenge offering a 200,000 euros prize (about $200,000) to any person who can prove a paranormal phenomenon. The lab Web site will make also some of the students' works available to the public as "*Z-Files.*" Obviously, Z is for Zetetics.

Science is a self-corrective process of discovery, hence contrary to all dogma and all parasciences. Paradoxically, pseudosciences have a very *positive* role to play in the discourse on scientific methodology. They have a null performance power (that is, no scientific progress can be attributed to them), yet—by the example of their absurdity—pseudosciences could lead to the consolidation of reason and a wider diffusion of the scientific method.

Therefore it is legitimate to be interested in paranormal phenomena and nobody has the right to outlaw their seductions. But we have also to insist that the right to dream has a counterpart: the duty of vigilance.

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For a more complete information on Zetetics, see my lecture in the Proceedings of the 10th Euro Skeptics Maastricht Congress, 1999, of which the present text is a shortened version.

Broch, Henri. 1985, 1997. *Le Paranormal.* Paris: éd. Le Seuil

———. 1991, 1994. *Au Coeur de l'Extra—Ordinaire.* Bordeaux: éd. Horizon Chimérique (with a thematic index and a bibliography of about 1,000 Zetetic titles allowing one to find some documentation on almost any "paranormal" field). Soon available at book-e-book.com. □

Paraneuroscience?

Psychology is the study of individual cognitive behavior and parapsychology is the study of psychic phenomena. Neuroscience is the study of the brain and is a discipline closely related to psychology—so why is there no paraneuroscience?

KYLE KIRKLAND

The study of psychic phenomena, or psi, is often associated with psychology, and even though most psychologists aren't enthusiasts (Bem and Honorton 1994), psi research is also known as parapsychology. Neuroscience, the study of the brain, is a discipline related to psychology, though it generally has a more biological perspective. However, neuroscience doesn't seem to get the attention of psi researchers.

Psychology has parapsychology, so why isn't there a paraneuroscience? Not that neuroscientists are complaining, but you just can't help noticing that most of the other sciences have "fringes": physics has metaphysics, chemistry has alchemy, biology and physiology have vitalism, astronomy

has astrology, anatomy has phrenology and palmistry.

But no paraneuroscience, as yet. Neuroscience is a young discipline—the term "neuroscience" only came into use in the late 1960s—but it has enjoyed some important advances recently amid a surge of research in the 1990s (the "Decade of the Brain" as declared by President Bush in 1990). Over 20,000 scientists typically attend the annual convention of the Society for Neuroscience; the breadth and depth of the work presented there is impressive. Neuroscience encompasses all aspects of brain function, including computation, development and learning, and behavior.

The relatively short history of neuroscience means that there're no roots in superstition, as there are in the older sciences. So there's no history for a fringe to perpetuate, no "ancient wisdom" to latch onto. *Still, neuroscience is an attractive* setting for a fringe. There is presently a notable lack of general theories that would otherwise constrain speculation, unlike in physics and chemistry; also, the wide range of topics covered in the field is fertile ground for budding paraneuroscientists.

The relatively short history of neuroscience means that there're no roots in superstition, *as there are in the older sciences. So there's no* history for a fringe to perpetuate, no "ancient wisdom" to latch onto.

The absence of a paraneuroscience is therefore puzzling. Some of the reasons involve the nature of psi, which could presumably form the basis of a paraneuroscience. But most of the reasons have more to do with the nature of neuroscience research—the interpretation of which is usually difficult and often humbling to those who try. Consequently, neuroscientists are a rather cautious lot.

Let's begin with the fundamental principle of neuroscience: Many functions of the brain (such as sensation and perception, movement, and thinking) derive from the electrical activity of small cells in the brain called neurons (and some help from other cells called glia).

Evidence for this is legion. Electroencephalography (EEG) is a record of the electrical activity of the brain, or "brain waves," and EEGs invariably correlate with a person's behavior and conscious awareness. (Newer methods to image the brain, such as Positron Emission Tomography and functional Magnetic Resonance Imaging, detect metabolic changes and not electrical currents as does EEG, but the metabolic changes are a consequence of electrical activity.) Researchers are also able to correlate perception with the activity of single neurons recorded from small electrodes (Parker and Newsome 1998). Even consciousness is attributed to the activity of neurons, and some ideas of how that happens have started to appear in the scientific literature (Crick and Koch 1998).

The Improbability of Psi

If neurons are crucial to cognition, a fact that neuroscientists are convinced is true, then this precludes a number of interesting phenomena, including out-of-body experiences and ghosts. Such things are impossible, since perception and movement are mediated by neurons. Of course you can simply postulate cognition without active brain cells, but that wouldn't be paraneuroscience—that would be antineuroscience.

A big problem with psychic phenomena is that they just don't fit the way that neural networks and the brain function. The transfer of information due to telepathy or clairvoyance would be perplexing to say the least. Not that information can't be transmitted through space—it happens all the time in the form of electromagnetic waves (Krauss 1998)—but how would the information get coded and decoded by the brain?

It's currently believed that knowledge and memories are stored in synapses, which are junctions where one neuron communicates with another. Neurons make a lot of synapses, forming complex "circuits" known as neural networks which process information. The computations necessary for various perceptual and motor tasks are thus performed by neurons working together and communicating via synapses. Changes in the synapses alter this process, of course, and that's how a person or an animal learns and remembers. Synaptic changes, if relatively long-lasting, represent knowledge gained by experience.

The problem for wannabe psychics is that people have widely varying experience, and thus different neural networks. Individual differences can include even the location of the neural network; the speech centers of the human brain, for example, can be found in either the left or the right hemisphere. And regardless of location differences, neural networks evidently don't work exactly the same way in every person. This is particularly clear from the imaging studies, which show that there's a lot of variance in how brains work. Variability is also prominent in animal studies.

So how would telepathy work? It wouldn't.

Even if you could somehow get neurons from different brains to communicate across space and time, they wouldn't know how to talk to each other. In order to decode a signal you've got to know how it was coded, and unless you've got a long time and a lot of recordings of the individual who "sent" a message, there's no way you'll figure it out.

But the problem gets even worse. Not only do people have their own personal codes and cognitive strategies, but these things change quickly over time. One reason for the changes is attention: when a person pays attention to certain stimuli, and not others, this affects which neurons will respond to the

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stimuli and what the response will be.

Thus, a message transmitted from one brain to another has little chance of being decoded; it probably wouldn't even end up in the right place, either, depending on the state of the receiver's brain.

To get around this unfortunate impasse, you could postulate the existence of a mind, separate and distinct from the brain, which operates on vastly different principles. Some philosophers do, and there are various arguments for and against it (Churchland 1986). But even so, it wouldn't be paraneuroscience, because it would have nothing in common with neuroscience.

There's something else about psychic phenomena that makes them extremely difficult to accept: Psi has a distinct inability to make sense.

Hypotheses in neuroscience, as in biology, require accumulation of considerable evidence before they're taken seriously. That's because of stochasticity, or randomness; not only is there variability in individuals, but even neurons of the same individual are not easily predictable. (We say they are stochastic.) You need a lot of evidence to show something is true in such cases, otherwise you could be misled by normal statistical fluctuations (Cohen and Stewart 1998).

Since overwhelming statistical evidence is sometimes hard to come by, new ideas are often judged to be worthy of pursuit, or not, by how well they fit in with principles that are already well established. It's the plausibility factor, and psi just isn't plausible.

Evolution, for example, is a cornerstone of all biology, as well as related disciplines such as neuroscience. If psi exists it must have evolved, and since it would confer an enormous advantage, you'd think everyone would have psychic power. Not so. That requires an explanation.

Furthermore, if psi really exists, how come psychics haven't been able to loot the Las Vegas casinos? Dean Radin, a prominent psi researcher, claims that there are too many distractions in casinos, and that the odds are too great for weak psychics (Miller 1998). If you accept that, then how about the stock market? In particular, what about derivatives like options and futures? With that kind of leverage, you could make a fortune if you knew what would happen in advance, even if you're not always right on the mark. And you can place your bets using the Internet in the comfort and silence of your own home, or while engaged in a seance if that's your thing. Why aren't psychics rich? That requires an explanation. Like cooks and meals, too many explanations spoil a hypothesis, and improbability builds up quickly.

It's not that new ideas are necessarily bad. A new idea should always be considered, even if there's no evidence for it, in which case it's called "speculative." If the new idea runs counter to an empirical fact or widely accepted theory, and thus requires an explanation, then it must be considered with suspicion. It's called "anomalous." If the new idea runs counter to many facts and accepted theories, as does psi, it probably won't get much consideration. It's called "absurd."

Alternatives

But there's another factor in the evaluation of ideas: are alternatives available? Can you explain the phenomenon in some other way?

That's one of the main things that seem to bother skeptics of psi: there's no definition of psi except a negative one. No one knows what psi is, so it can only be inferred to exist by eliminating every alternative explanation. And that's hard to do (Hansel 1989).

It's particularly hard for neuroscientists to do, since there are often alternative explanations for many phenomena in this discipline. Neuroscience experiments are often difficult. I've already mentioned the stochasticity, which is of course a problem. But there are other difficulties. Often the subject of the experiment isn't a reasonably behaved mechanical device, as in physics, or a set of compounds as in chemistry, but a very complex object—the mammalian nervous system, for example. Results can be hard to interpret, and can all too easily lead you down the wrong path.

One recent example involved electrical recordings of stimulated neurons in the cat visual system. Many cells fired together, as if each knew what the others were doing—well beyond what would be expected from typical neural communication. Spooky action at a distance? Not quite; it was found to be due to the vertical refresh signal of the computer that generated the visual stimuli (Wollman and Palmer 1995). The neurons were responding en masse to this signal, which had nothing to do with the intended stimulus.

Experiments involving animal learning provide many more examples. Getting an animal to learn something can be frustrating; you can't just give instructions in the appropriate language. Even more frustrating is trying to figure out exactly what the animal actually learned. Often what it learned isn't the same thing as what you tried to teach it.

Let's say you show monkeys a visual stimulus (say, a picture of a butterfly), then present a series of visual stimuli, one of which is the same butterfly again. You then reward the monkey for responding to the second butterfly. Have you taught the animal to respond to the one stimulus in the series which matched the original stimulus?

Careful. In reality the monkey may be simply responding to any repeated stimulus. If you show a stimulus twice in the series—even if this repeated stimulus is different from the original—the monkey might respond (Miller and Desimone 1994).

Rats are also notorious for developing alternative strategies to perform a task. "They learn every way to do a task except the way you want them to," an exasperated graduate student once told me.

Priming and Psychics

So interpreting how an animal thinks is tricky. Is the same true for people? One interesting phenomenon is that people are often influenced by nonconsciousness memories. This is known as priming (Tulving and Schacter 1991). You see or

hear something, maybe something that's not important enough at the time to form a conscious memory of, but then later your judgment and decisions may be subtly affected by it—and you don't know why, because the memory isn't conscious.

Priming is probably responsible for a lot of "intuition." It may also explain, in some cases, reports of "psychic" ability. A "telepathic" transmission may simply be due to subconscious stimuli or memories. The same mechanism may be responsible for the claimed ability to predict the future.

I once saw the future, about three seconds in advance. I had a witness, too, who widely and persistently proclaimed the fact. He was one of my roommates when I was in the Air Force; one morning at 5:00, just before an important mission, I jumped out of bed and ran across the room to turn off an irritatingly loud alarm clock a few seconds before it was set to go off. (It had just begun to ring as I reached it.)

My roommate, who had been awake, was astounded. So was the rest of the squadron, when they were told. So was I, until late that evening, when I did some experimenting with the clock and discovered that three seconds before the alarm went off, there was a barely audible click. Of course I never told anyone.

One final problem is that people love patterns and go out of their way to find them. It's not easy to produce anything that is totally random. There always seems to be some sort of pattern in a set of data or ambiguous stimuli, if you look at it long enough. That's indeed true for many of the random number generators used in biological and neuroscientific research. Often they are so-called *pseudo* random number generators, since they are generated by sophisticated algorithms running on computers (which are deterministic, not stochastic devices).

The problem is that the algorithms sometimes produce patterns, which can be detected by people. Sometimes detection is difficult and takes a while; sometimes not (I once had a UNIX computer which had a pre-written routine to generate "random" numbers—but the sequence of numbers it generated invariably alternated between even and odd). The same applies to other "random" events, whether generated by computers or other machines.

People certainly aren't good random number generators. Write down a series of numbers as quickly as you can, and try to make the series random. Review the numbers afterward; do you see a pattern?

People with the same experiences tend to see the same patterns in what is supposed to be random stimuli—which isn't psychic transmission, but simply a common aspect of nervous systems.

So what about paraneuroscience? I'm afraid it's going to be tough to start one. Not that there isn't any "anomalous" data; the problem is there's too much. And too many plausible ways, completely unrelated to psi, to explain it.

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The New Bogus Majestic-12 Documents

The new crashed-saucer documents, like their 1987 predecessors, are riddled with flaws.

PHILIP J. KLASS

"Majestic Twelve"—better known as "MJ-12"—first achieved international fame in the world of UFOlogy in mid-1987. It was then that UFOlogist William L. Moore and two associates made public three (purportedly) "Top Secret" documents which indicated that President Harry Truman had created a super-secret MJ-12 group forty years earlier to deal with extraterrestrial (ET) visitors. Truman's (alleged) action was prompted by an alleged crashed-ET craft that had been covertly recovered near Roswell in mid-1947.

The Roswell crashed-saucer claim had been the centerpiece of a book published seven years earlier (1980) which Moore had coauthored with Charles Berlitz. (Berlitz

previously authored a book describing the "mysterious dangers" of the Bermuda Triangle.)

Recently, a large batch of additional "Top Secret Majestic Documents" have emerged, provided by another UFOlogist named Tim Cooper, who claims he obtained them from several covert sources. Their authenticity has been endorsed by Robert Wood, a respected, retired McDonnell Douglas scientist and his son Ryan. (Wood is a member of the nine-person Executive Council of Peter Sturrock's Society for Scientific Exploration.) Based on the Woods' assessment, wealthy Silicon Valley software expert Joe Firmage, who recently revealed his conviction that some UFOs are extraterrestrial visitors, also endorsed Cooper's documents in mid-1999.

However, on November 25 the International Space Sciences Organization (ISSO), which Firmage recently created to pursue his UFO interests, issued a statement that "ongoing research indicates that *many, possibly all, the so-called MJ-12 UFO documents were officially fabricated as instruments of U.S. covert psychological warfare . . .*" (emphasis added). This is ridiculous! The new Cooper documents, like their 1987 predecessors, are so riddled with flaws that they could never fool Soviet or Chinese intelligence experts. Even some long-time pro-UFOlogists have denounced them as obvious counterfeits.

The new Cooper documents, like their 1987 predecessors, are so riddled with flaws that they could never fool Soviet or Chinese intelligence experts. Even some long-time pro-UFOlogists have denounced them as obvious counterfeits.

One of the original MJ-12 documents released by Moore and his two partners (UFO lecturer Stanton Friedman and TV producer Jaime Shandera) purported to be a memo from President Truman to Defense Secretary James Forrestal, dated September 24, 1947, which authorized the creation of the MJ-12 group. My investigation revealed that the Truman signature was a pasted-on photocopy of a genuine signature—including accidental scratch marks—from a memo that Truman wrote to Vannevar Bush on October 1, 1947 (see "New evidence of MJ-12 hoax," SI 14[2], Winter 1990).

A second MJ-12 document released by Moore et al. purported to be a November 18, 1952, briefing for President-elect Eisenhower, prepared by Rear Admiral R.H. Hillenkoetter, who had been director of the CIA and, purportedly, was now head of MJ-12. There were numerous flaws in the "Eisenhower Briefing Document" (EBD), the most obvious being *its reference to the (bogus) Truman memo of September 24, 1947.*

Further, the EBD repeatedly used a very unusual date-format—a hybrid combination of civil and military formats with a superfluous comma, i.e., 18 November, 1952. This unusual hybrid date-format was one repeatedly used by William L. Moore in his personal letters—until I pointed out this "curious coincidence" in my first article debunking the original MJ-12 papers (see SI 12[2], Winter 1987–1988). The third of the MJ-12 documents made public by Moore et al. in mid-1987 purported to be a brief memo, dated July 14, 1954, from Robert Cutler to USAF Chief of Staff General Twining informing him of change of date to brief the President on the "MJ-12 Special Studies Project." Investigation revealed that on the date that Cutler allegedly wrote the memo, he was out of the country. Moore claimed that he and Shandera had found the Cutler memo in an unlikely location when they visited the National Archives. The memo, which had been double-folded, could easily have been carried into the Archives in Moore's or Shandera's coat pocket. Less than two years before Moore made public the initial MJ-12 papers—on April 16, 1983—he had confided to then-close friend and UFOlogist Brad Sparks that he was contemplating creating and releasing some hoax Top Secret documents—as first revealed in the March 1997 issue of my *Skeptics UFO Newsletter.* Moore explained to Sparks that he hoped such bogus documents would encourage former military and intelligence officials who knew about the government's (alleged) UFO coverup to break their oaths of secrecy. Sparks strongly recommended against the idea.

It was not until nearly seven years after release of the original MJ-12 documents that a new "MJ-12 document" surfaced on March 14, 1994. On that date, Don Berliner, a long-time pro-UFOlogist, received in the mail an undeveloped roll of 35 mm film from an anonymous source. When the film was processed, Berliner found photos of what purported to be copies of pages from a "Top Secret/MAJIC/Eyes Only" special operations manual (SOM 1-01) intended to inform military crews how to recover crashed saucers and their ET crews. SOM 1-01, purportedly printed in April 1954, contains many flaws. For example, it stated that crashed ET craft should be sent to "Area 51 S-4" in Nevada. But that portion of Nellis Air Force Base was not given the name "Area 51" until several years *after* SOM 1-01 allegedly was printed.

As a result of numerous flaws in SOM 1-01, a statement denouncing it as counterfeit was released on March 14, 1999. It was signed by Berliner and several other prominent pro-UFOlogists. By this time, a new batch of more than a dozen Majestic documents obtained from Tim Cooper had recently been made public by Robert Wood and his son Ryan at a UFO conference in Connecticut. They had strongly endorsed the authenticity of the documents, although Wood admitted that there were flaws in them. But he claimed that these anomalies "tend to indicate authenticity. . . . [Document] hoaxers generally try to make sure they are perfect."

Washington-based aerospace journalist Philip J. Klass is author of numerous books critically evaluating UFO claims, chairman of CSICOP's UFO Subcommittee, and editor of Skeptics UFO Newsletter.

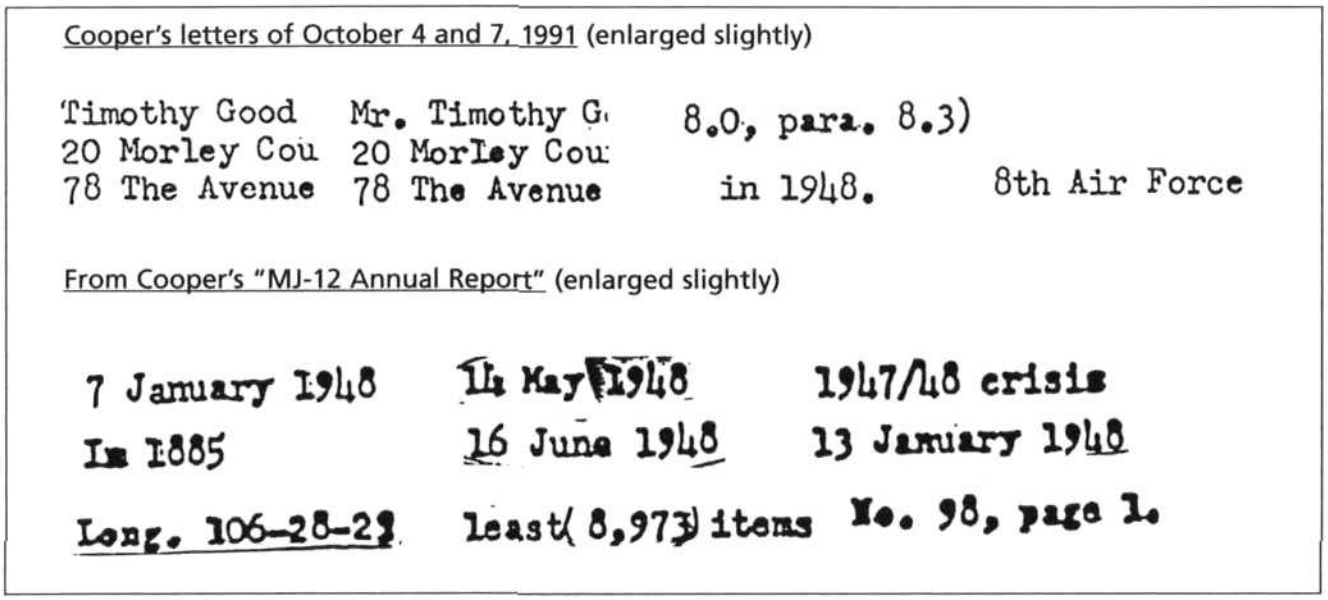


Figure 1. "Elevated 8" in Cooper's letters *and* in one of his "MJ-12 documents."

No mention was made by Wood that his long-time good friend, UFO lecturer Friedman—who remains one of the staunchest supporters of the original MJ-12 documents—had earlier investigated several of Cooper's documents and concluded that at least one was counterfeit. Friedman had reported his findings and suspicions about other Cooper documents in his book *Top Secret/MAJIC*, published three years earlier.

British UFOlogist Timothy Good, who in 1987 had strongly endorsed the authenticity of the original MJ-12 documents in his best-selling pro-UFO book *Above Top Secret*, has more recently characterized them as bogus, largely on the basis of the phony signature on the Truman memo of September 24, 1947. But in the early 1990s, prior to Good's disavowal of the original MJ-12 papers, he began to receive some of the "new" Majestic documents from Cooper.

Good's suspicions about the new Cooper documents were aroused by some factual anomalies in their content. More important, Good noted that mechanical flaws in the typewriter Cooper had used to write two letters on October 4 and October 7, 1991, resembled those of the typewriter used for one of his Majestic documents, allegedly typed in *1952*. At my request, Good provided me with copies of Cooper's two letters for analysis.

Cooper's two 1991 letters to Good not only had the same typeface as the (purported) 1952 Top Secret MJ-12 Annual Report, but more importantly the upper-case (capital) *G* and *N* were *slightly elevated* relative to the adjacent lower-case letters. However, an experienced questioned document examiner informed me that it was conceivable, though unlikely, that both Cooper and the 1952 document typist might have failed to depress the "shift key" to its lowest possible position when typing *G* and *N*.

However, both Cooper's letters and the 1952 document also have an "elevated 8"—which does not require the use of the typewriter's shift-key (see figure 1). This curious coincidence was reported in the November 1999 issue of *Skeptics UFO Newsletter*, a copy of which was provided to Wood. His response of December 13 (via e-mail) was: "The question is whether that ["elevated-8"] is a characteristic of that typewriter design as distinguished from any particular machine serial number. We need other examples from the same typewriter design and I would hope to find some."

In other words, Wood suggests that this mechanical flaw was a possible *uncorrected* characteristic of *all* of the typewriters produced by this manufacturer for at least several decades. Nothing further has been heard from Wood on this key issue since mid-December 1999.

Meanwhile, Tim Cooper posted a lengthy treatise on the Internet on December 30, offering his assessment of his "new Majestic documents." Highlights of Cooper's views are quoted below:

> The question of whether they [Cooper's documents] are genuine, authentic, or real is not the issue here. The important point . . . is the information contained in the documents themselves. . . . In my own humble opinion, the Majestic documents are basically reliable as far as content is concerned *with the exception of the questionable hypothesis that there are other intelligent, thinking, machine building cultures visiting planet earth on a regular, day to day basis* [emphasis added].

Yet the opening page of the Web site that the Woods have created to promote MJ-12 states: "The Majestic Documents: Evidence That We Are Not Alone. Curious about the documentary record of military and government participation with UFOs, wreckage retrieval, and extraterrestrials? This site is all about it! The documents, the forensics, the military and intelligence history, and stunning validating evidence. Join us on a journey into the beyond Top Secret world that a government cabal has been hiding since 1941." (One of Cooper's documents claims a crashed saucer was recovered in the spring of *1941* near Cape Girardeau, Missouri, six years before the alleged Roswell Incident. If true, the Eisenhower Briefing Document completely forgot to mention this historic event.) □

Visionary of *2001*, and Way Beyond

KENDRICK FRAZIER

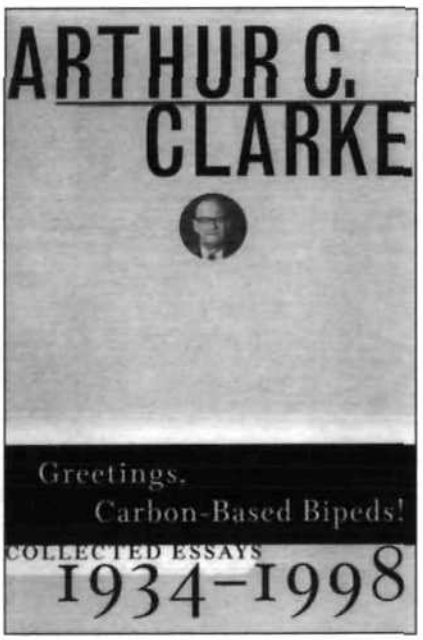
Greetings, Carbon-Based Bipeds! Collected Essays 1934–1998. Arthur C. Clarke.
St. Martin's Press, New York, 1999. ISBN 0-312-19893-0. 558 pp. Hardcover, $35.

I first happened upon Arthur C. Clarke's nonfiction back in the early 1950s when I somehow found in my junior high school library in Windsor, Colorado, a copy of the wondrously named *Journal of the British Interplanetary Society*. Clarke had recently been the society's chairman and wrote frequently for its journal.

Here was a man with his eye and mind on the future, and that was for me. Ever since then, I have considered Clarke, through his published writings, an intellectual and literary companion and guide. I realize he has played the same role for countless other people worldwide.

No one has been a more cogent futurist. No one has been a more effective proponent of space exploration and the inevitability of the human spirit finding its way into space. Wernher von Braun was prominent in the role for a key period in the fifties and sixties, and so were Willy Ley and science fiction greats like Robert Heinlein and Ray Bradbury, and in later decades many planetary scientists, leading among them Carl Sagan. But from the 1940s on, Clarke influenced generations of scientists, engineers, thinkers, and creative artists. Gene Roddenberry's *Star Trek* television series—"Arthur literally made my *Star Trek* idea possible," Roddenberry once said—and Stanley Kubrick's (and Clarke's) *2001: A Space Odyssey* movie then in turn influenced and inspired millions of other people from all walks of life.

Clarke even shaped the Space Age in a very direct way. In a now-famous 1945 paper, he proposed placing into



geosynchronous orbit 22,300 miles above the equator and equidistantly around Earth communications satellites which would provide global television and radio services to all nations. That happened almost sooner than he could have expected.

In both his science fiction and his nonfiction, Arthur Clarke has always combined soaring imagination with clear-eyed rationality. It is a rare combination. He has written of imagined civilizations eons in the future and the future of our own civilization (*Childhood's End, Songs of a Distant Earth*), but he always does it with crisp, informal, economical prose and a centered sense of reason and clarity that somehow makes the incredible seem understandable.

Clarke and his friend Isaac Asimov had a whimsical running dispute over who was the greater science writer and science-fiction writer. They eventually settled it with their Clarke-Asimov treaty. Clarke's 1972 book *Report on Planet Three* subsequently offered this dedication: "In accordance with the terms of the Clarke-Asimov Treaty, the second-best science writer dedicates this book to the second-best science-fiction writer."

Clarke began his writing career in the 1930s and it continues today, so it is not surprising that a volume representing his nonfiction essays over that entire span, even if it is highly selective, must be rather large indeed. *Greetings, Carbon-Based Bipeds! Collected Essays 1934–1998* is that welcome work. Clarke says he long resisted entreaties to undertake the mammoth task of trying to trace a literary career "spanning almost seven decades." A persistent editor urged him to assemble a representative selection of his non-

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fiction writings in a single volume. "The success of my friend Martin Gardner's splendid anthology *The Night Is Large* [reviewed in SI, November/December 1996] has demolished the last of my feeble excuses," Clarke says in the preface.

Arthur Clarke has always combined soaring imagination with clear-eyed rationality.

He notes that Gardner divided his anthology into sections devoted "to his many interests: science, art, philosophy, religion, and so on. But not being such a polymath (who is?), I have put my essays in chronological order."

That works just fine. The 110 articles, essays, reviews, book introductions, short notes, and profiles range over all of Clarke's interests: futurology, space exploration, space technology, extraterrestrial intelligence, science communication, science fiction writing, science fiction movies, science and philosophy, science and religion, pseudoscience and fringe-science, undersea exploration, and everything in between. I'd recommend just dipping in at any point. I started with some of his short tributes to famous colleagues and peers: Willy Ley, Chesley Bonestell, Robert Heinlein, Isaac Asimov (that one also appeared in the Fall 1992 SKEPTICAL INQUIRER), Robert Bloch, Buckminster Fuller, Frank Paul, and Carl Sagan. In only a few sentences, Clarke manages to capture some of the essence of each of these fellow visionaries.

The fourth entry is that classic 1945 *Wireless World* article proposing communications satellites. (Following the lead of Stephen Hawking, whose editor told him each equation would halve sales, Clarke has expunged the paper of equations.) One of the last is his Science and Society essay in the June 5, 1998, *Science*, lamenting scientific illiteracy among policymakers, lambasting creationism, commenting on the end of the Cold War, suggesting more efforts to anticipate asteroid impacts, and discussing global warming. All as expected. But I was astonished when I first read the paper in *Science* to see that it concludes by proposing that Pons and Fleischmann's cold fusion claims will be vindicated and they "will be the only scientists ever to win both the Nobel and the Ignoble Prizes." This must be a rare lapse in good judgment in Clarke, but he clearly believes it, because he repeats the prediction in the anthology's final essay, "The Twenty-First Century: A (Very) Brief History," published in February 1999.

The anthology's first discussions of UFOs, I was surprised to find, go way back to 1953, when Clarke critically and effectively reviewed "a fraudulent book," *Flying Saucers Have Landed*, and later participated in a BBC television program on flying saucers. He knocked authors George Adamski and Desmond Leslie for nonexistent scholarship, gullibility, and inclusion of "flying saucer" photos that are obvious artifacts. Clarke, with some help from Scotland Yard, was even able to refake Adamski's pictures, and show that at least one of his saucers must have been inside the tube of his telescope. Such books, he complained, do a disservice by scaring serious researchers and people with intellectual integrity away from a field that "could be important." In his introductory note, Clarke says "he never imagined" that the topic of UFOs "would be even more in the news four decades later."

Sure enough Clarke was back four-and-a-half decades later with another lively critical discussion, "More Last Words on UFOs" in the *Times* of London in 1997. He recalls the Adamski nonsense and reminds "the UFO fanatics how earlier widely accepted stories of alien meetings turned out to be ludicrous fabrications."

In a timely comment, he calls "particularly ludicrous" the "widespread idea (à la *Independence Day*) that for several decades some supersecret branch of the United States has had alien spacecraft—and aliens!—in its possession. Anyone who will believe that will believe anything." Clarke says he has known many of the people who would need to be involved in such a cover-up, and he can assure readers that such a secret "would have a half-life of about forty-eight hours."

He also can't take reports of alien contact seriously because the described occupants of alien craft are always essentially humans (with a few cosmetic variations). "Genuine extraterrestrials would be really alien—as different from us as the praying mantis, the giant squid, the blue whale."

As for finding life elsewhere in our own solar system, he still (along with many planetary scientists) holds out that the best hope is not on Mars but beneath the ice floes of the oceans on the Jovian satellite Europa, a theme in Clarke's *3001: The Final Odyssey*, the fourth in the series of novels that started with *2001*.

The anthology includes a lively discussion of Clarke's involvement starting in 1964 with Stanley Kubrick developing the ideas behind the *2001* movie (originally titled *Journey Beyond the Stars*), co-writing the screenplay, and authoring the novel. Kubrick was determined to make the proverbial "really good" science fiction movie, says Clarke. "What we were trying to create was a realistic myth." (For a much fuller report see Clarke's 1972 book *The Lost Worlds of* 2001.)

One of the few real forerunners to *2001* was the 1950 movie *Destination Moon*, which as kid I remember having some of the same impact on me as the later Kubrick movie. Clarke provides an appreciative and perceptive contemporary review of that movie that acknowl-

edges its then-unprecedented visual qualities and attention to scientific detail.

To my mind Clarke's most memorable nonfiction pieces are the two opening chapters to his 1962 book *Profiles of the Future.* I am pleased to have a copy of the 1973 revised edition personally inscribed by Clarke. In introducing those two chapters in *Greetings, Carbon-Based Bipeds!,* Clarke agrees that *Profiles of the Future* "may be my most important work of nonfiction." The whole book, subtitled "An Inquiry Into the Limits of the Possible," is rewarding reading, but those first two chapters are must reading to anyone, we skeptics especially included, who tries to think about the future. They are titled "The Hazards of Prophecy: The Failure of Nerve" and "The Hazards of Prophecy: The Failure of Imagination." They remind us how, "With monotonous regularity, apparently competent men have laid down the law about what is technically possible or impossible—and have been proved utterly wrong, sometimes while the ink was scarcely dry from their pens."

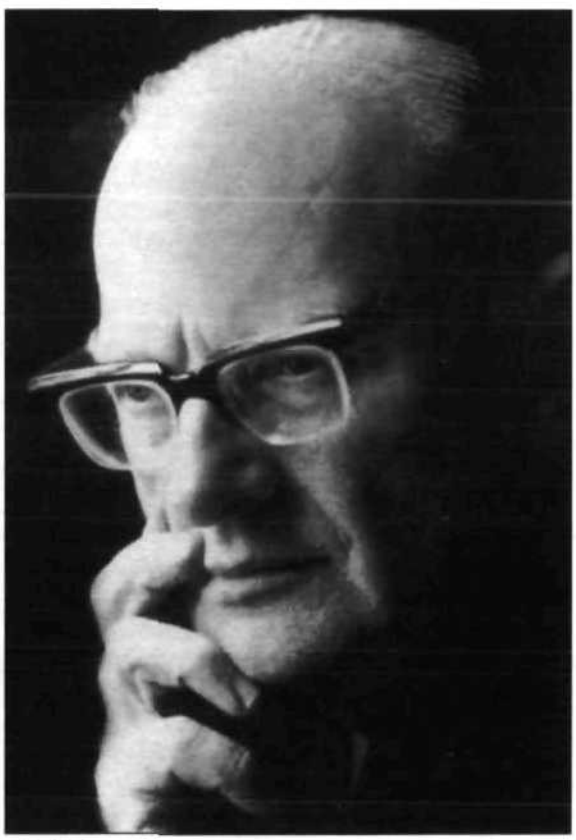
It was in this first chapter that Clarke formulated his now famous Clarke's Law:

> When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong.

Clarke's Third Law, "Any sufficiently advanced technology is indistinguishable from magic," is even more widely quoted.

Both serve highly instructive warnings against making absolutist statements, but I urge those who might take them too literally to also consult Isaac Asimov's witty and equally memorable essay, "Asimov's Corollary" (reprinted in the Spring 1979 SKEPTICAL INQUIRER and in the first SI anthology, *Paranormal Borderlands of Science,* Prometheus Books 1981). Asimov accepts Clarke's Law but he notes the human tendency to embrace *anyone who propounds comforting,* pseudoscientific beliefs such as astrology, flying saucers, creationism, and life after death. So he offers as a counterpoint to Clarke's Law his Asimov's Corollary:

> When, however, the lay public rallies round an idea that is denounced by distinguished but elderly scientists and supports that idea with great fervor and emotion—the distinguished but elderly scientists are then, after all, probably right.



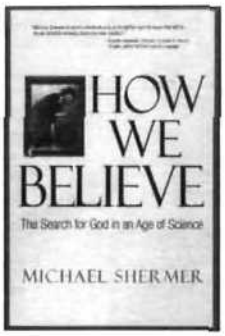
Arthur C. Clarke

Clarke knocked authors George Adamski and Desmond Leslie for nonexistent scholarship, gullibility, and inclusion of "flying saucer" photos that are obvious artifacts.

Both Clarke and Asimov, it seems to me, are right.

Clarke's essay "Credo" was new to me and another pleasant surprise. Had I known of it a year ago, I would have *tried to include it in* SKEPTICAL INQUIRER's July/August 1999 special issue on Science and Religion. Clarke's skeptical views about religion are clear from his science fiction novels such as *The Fountains of Paradise,* but I found this 1991 essay a wise and perceptive discussion of narrow and broad concepts of God, the "hijacking of morality by religion," his refusal to take seriously "all dogmas and revelations whose acceptance demands faith," and how science can eventually achieve truthful answers to profound questions that dogmas can only pontificate about. Along the way Clarke notes how appalled he is that so many bookstores and newsstands are "poisoned with mind-rotting rubbish about astrology, UFOs, reincarnation, ESP, spoon-bending, and especially 'creationism,' . . . which implies that all the marvelous and inspiring story of evolution, so clearly recorded in the geological strata, is all a cosmic practical joke."

Spending some hours with *Greetings, Carbon-Based Bipeds!* is a wonderful way to learn where our modern scientific and technological society came from, where it might be going, and to delve into the rich mind and thoughtful insights of one who has helped shape and explain both the past century and the ones to come.



Why Everybody Believes in Fairy Tales

MASSIMO PIGLIUCCI

How We Believe: The Search for God in an Age of Science. By Michael Shermer. Freeman, New York, 1999. ISBN 0-7167-3561-X. 302 pp. Hardcover, $24.95.

Writing books on science and religion seems to have been a particularly common enterprise in the late twentieth century. Recent examples range the whole gamut from claims that science confirms every detail of the Bible (G.L. Schroeder's *The Science of God: The Convergence of Scientific and Biblical Wisdom*); to theistic science (P. Davies's *The Mind of God: The Scientific Basis for a Rational World*); to assertions of no conflict between science and religion (S.J. Gould's *Rocks of Ages*); to genuine skeptics who flirt with fuzzy concepts of spirituality (C. Raymo's *Skeptics and True Believers: The Exhilarating Connection Between Science and Religion*). Even the Pope has written on the topic with considerable scholarship (John-Paul II. *Fides et Ratio.* Vatican Press, available at www.catholic pages.com/documents/fides_et_ratio.asp, Vatican City).

If you don't have the time to keep up with all of this and you can read only one book on science and religion, Shermer's is by far the most insightful, original, and entertaining reading of them all, though the book has its limitations. While weaved together as a monothematic effort, it is clear that some of the chapters are essays from the pages of *Skeptic* magazine written at different times and for slightly different purposes. Yet Shermer patches it together well enough that you'd hardly notice the sutures, and the result is well worth your time.

How We Believe is divided into two parts, one on God and belief, and another on religion and science. The two appendices are also valuable additions to the main volume, detailing the methods and results of a survey by Shermer and social scientist Frank Sulloway on why people (including skeptics) believe or don't believe in God. This effort is a good example of how science can ask hard questions about religion without even considering the problem of the existence of God.

One of the most interesting results of the survey emerges from a comparison of why people believe (or disbelieve) in God and of why they think other people believe (or disbelieve). Let's consider skeptics first. According to this category, the most important reason they believe in God is because of the evidence of design in nature (29 percent). However, this same reason ranks only fifth (9 percent) when the same individuals are asked why other people believe in God; the primary reason given in that case is that people find belief to be comforting. Interestingly, the same is true for a random (i.e., non-skeptic) sample of the population: Most people like to think they believe in God for what we might call "intellectual" reasons, yet they also maintain that other people have the same belief primarily for *emotional* reasons.

One of Shermer's first observations is that, contrary to proclamations by both Nietzsche and *Time* magazine, God is not only not dead, but alive and staging a smash comeback tour at the turn of the millennium. The author then focuses on why people believe in supernatural beings, rather than on the usual question of the very existence of such beings. Make no mistake about it, Shermer is as skeptical as they come, and while he officially claims to be an agnostic in the original sense of the word as proposed by Thomas Huxley (i.e., one who doesn't have knowledge of God), he is a nontheist who, by default, doesn't believe any nonsense. In fact, his chapter 6 is about alleged proofs of the existence of God, but these are analyzed for what they tell us about the believer, and not as an investigation into the character of the Almighty.

According to Shermer, one main reason people are so prone to believe all sorts of fantasies is because we are pattern-seeking animals. Throughout the history of primates (and therefore of humans), the ability to recognize nonrandom patterns in nature has meant the difference between finding and not finding food, or between escaping or dying from the jaws of a predator. However, natural selection has not endowed us with a very good way of investigating the causal basis of the patterns we observe. All that is needed for selection to operate is that recognizing the pattern is sufficient to get you out of trouble most of the time. In fact, even making mistakes and identifying patterns that are actually random will not be selected against unless such mistakes prove to be fatal too often. As Shermer puts it, humans have a certain tendency to commit one of two errors: believing a falsehood or rejecting a truth. Given that we are pattern-seeking animals, we tend more often to accept nonexistent patterns as indications of underlying truths. We are more gullible than skeptical by nature.

In the second part of the book, dealing with the relationship between science and religion, Shermer recapitulates his model of the three possible modes such relationship can take. One can adopt a "same worlds" position, in which science and religion are both exploring the same reality and will con-

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verge on the answers. Many theistic scientists certainly believe so, and this view has provided the basis for much Christian apologetics. This position, however, does lead one into rather uncomfortable fits of mental gymnastics, and serious scientists do not usually embrace it. The second possibility is what Shermer terms the "different worlds" model, in which science and religion are like apples and oranges: they deal with very different realms and therefore cannot be in conflict, even in principle. Harvard evolutionary biologist Stephen Gould most prominently espouses this point of view. The last possibility is the "conflicting worlds" hypothesis, in which either science or religion is the valid approach to reality; whenever they disagree, one of the two has to be wrong. Creationists such as Duane Gish and evolutionists such as Richard Dawkins fall into this category.

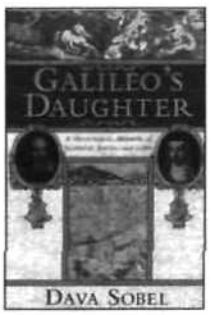
Another main reason for the ubiquitous belief in a god or gods across time and cultures is discussed in chapters 7 and 8. Humans are not only pattern-seeking animals, but also storytellers. That explains why we pay more attention to a single story well told (even if false) than to reams of hard data (even if accurate). No wonder lobbyists in Congress count more on hearings, wherein a few people tell convincing if unrepresentative "horror stories" in favor of their agenda, than on providing accurate but boring statistics to senators and representatives.

In chapter 8 we are given a rare treat, the analysis of a new myth emerging, evolving, and eventually dying, all in the span of a few years. The author explains the genesis of the ghost dance myth among Native Americans at the end of the nineteenth century and how it was connected to their oppression and the hope that a messiah would deliver them from the powerful enemy. Sounds familiar? Yes, just substitute Rome for the federal troops, the Jews for the natives, and Jesus for a Paiute Indian named Wovoka, and you have the origin of Christianity. The latter, however, lasted for two thousand years and is still going strong.

I suppose a chapter on the millennium couldn't be avoided, and Shermer presents an interesting comparison of the millennium syndrome with the one we have been experiencing for the last few years. On the latter, he records the embarrassing series of failed doomsday prophecies accumulated by the Jehovah's Witnesses. According to this sect, the world should have ended in 1874, 1878, 1881, 1910, 1914, 1918, 1920, 1925, and many other dates all the way up to 1996, when the group admitted that "the generation that saw the events of 1914" would not witness the end of the world after all. You'd think that stepping up to the pulpit the week after an Armageddon prophecy failure would be rather embarrassing, but we keep seeking patterns and we love good stories!

The only chapter of this book that seems definitely out of place is the last one, on "Gould's dangerous idea." The idea in question is that the story of life on Earth is a result not only of necessity as imposed by natural selection, but of contingency, the long-term effects of particular configurations of events that have occurred in the past. This is a field of research dear to Shermer, who has made original contributions to it and it is his personal homage to Stephen Gould. While I found the arguments well presented and convincing (I was especially amused at the effectiveness with which Shermer demolishes some of Daniel Dennett's criticisms of Gould), I have to stretch my imagination to understand what the whole thing has to do with why people believe in God.

Nevertheless, Shermer's book is much more credible than Schroeder's or Davies', at least as scholarly as the Pope's, more insightful than Raymo's, and even decidedly more original than Gould's. Again, if you want to read one book on science, religion, and the eternal human propensity for gullibility, *How We Believe* is the one.



Galileo's Daughter Speaks

JAMES C. SULLIVAN

Galileo's Daughter: A Historical Memoir of Science, Faith, and Love. By Dava Sobel. Walker & Company, New York, 1999. 420 pp. Hardcover, $27.

"The day after his sister Virginia's funeral," author Dava Sobel says near the book's beginning, "the already world-renowned scientist Galileo Galilei received [...] the first of 124 surviving letters from the once-voluminous correspondence he carried on with his elder daughter. She alone of Galileo's three children mirrored his own brilliance, industry, and sensibility, and by virtue of these qualities became his confidante."

Two major surprises, at least for this reviewer, are contained within this tome: the first is that Galileo had three children by the same woman whom he never married. The second—this reviewer, in all fairness to the author, cannot divulge. Suffice to say it may be found near the end of the book. In between those two tantalizing tidbits of information are numerous other aspects of Galileo's life and reactions to them by his eldest daughter, Virginia.

Galileo had placed Virginia, and a

James Sullivan writes from South Bend, Indiana.

younger sister, Livia, both of a tender age, in a cloistered Sisters of Poor Clare Convent of San Matteo, south of his home in Florence, Tuscany. Both girls became nuns. But it's Virginia, who took the religious name Suor Maria Celeste upon becoming a nun, and her father that this story centers on.

Galileo's daughter's correspondence is printed throughout the book. In these missives from her convent, she worries about her father's welfare, what he is doing, and generally everything that is going on outside. Besides those cares, this nun looks after her own younger sister, now named Suor Arcangala, who resides in the same convent, and her young brother, Vincenzio, who lives elsewhere.

Suor Maria Celeste's letters sparkle with daughterly and sisterly devotion. With what little time that remains after her religious duties, she cleans, sews, preserves, cooks, writes letters for other nuns, and does several other tasks for the convent, for her own sister, and for her brother.

The book deals with Galileo's scientific experiments and resulting books. His Vatican trial by the infamous Inquisition is also covered in detail, as well as his religious, political, and academic friendships all over the world. The bubonic plague threat is also discussed, along with Galileo's other health problems and his additional tribulations.

The tome describes how the Church persecuted and prosecuted Galileo for appearing to embrace the heretical Copernican concept that Earth goes around the Sun and not vice versa. The pontiff at that time, Pope Urban VIII, a former so-called friend of Galileo's and a science buff, pulled the strings behind the scenes at Galileo's trial. Like some of his predecessors and successors, this pope proved to be self-aggrandizing. Of course, he was protecting the Roman Catholic Church, which was still defensive about the Protestant Reformation and was facing challenges from scientists. The Inquisition had come to the fore again as a result.

Galileo knew full well what the Church's feelings were about the Copernican concept, and went to great lengths to make certain his book, which discussed Copernican ideas as theories only, could be published with the Church's approval. And he did get that permission. Nonetheless, his many enemies, who grew jealous of his scientific successes and fame, viciously turned upon him.

The scientist was found guilty of teaching a disavowed and heretical doctrine. His book was banned, being placed on the Vatican's prohibited books list known as the *Index*. He was sentenced to say specific psalms from the Bible for several years on certain holy days and to remain under house arrest, initially in Rome, later in Siena, and lastly in Arcetri, close by his daughter's convent.

Though allowed to visit Suor Maria Celeste, he was not allowed elsewhere nor supposed to have visitors who would discuss science and philosophy.

The nun's reactions to all that befell her father fill the book, and she continued to see to his needs. In return, he helped fulfill his daughter's and the convent's numerous needs. Sadly, Suor Maria Celeste passed away in 1634, at age 33, from a minor illness made worse by the lack of attention she devoted to herself. Her father lived on for another eight years. His grief over her loss, both as a parent and as the receiver of all her loving care, knew no bounds. But he struggled on without her.

His later years were hindered by illnesses and blindness. Still, his interest in scientific matters continued. He hired a young assistant, Vincenzio Viviani, who read aloud to the old man from scholarly works. And despite the Vatican punishment, Galileo met at his home with other scientists and friendly church officials often.

During those years, he also worked on another book, *Two New Sciences*, later to be renamed, having nothing to do with Copernicus or any heresy. Yet the Church refused Galileo permission to have this new work published. He managed to skirt that problem by having it printed in Holland, a country less under the Vatican's thumb. Galileo died at age 77 in 1642. Pope John Paul II declared publicly just 350 years later in 1992 that the scientist had been correct all along.

Dava Sobel, who previously wrote the much-lauded *Longitude*, resides in New York. *Galileo's Daughter*, like the previous book, is highly recommended.

The Manufacture of a Multiple

TRAVIS GEE

Making of an Illness: My Experience with Multiple Personality Disorder. By Gail Macdonald. Laurentian University Press. Available from Laurentian University Bookstore, Ramsey Lake Road, Sudbury, Ontario P3E-2C6. ISBN 0-88667-045-4, 111 pp. Paperback, $Cdn. 9.95.

In 1994, Allan Seltzer wrote a stinging critique of what has become an increasingly common psychiatric problem—Multiple Personality Disorder (MPD, now known as Dissociative Identity Disorder, or DID). Seltzer pointed out that (based in part on five cases that he had studied) there was reason to believe that MPD *was generated by therapists*. This is consistent with the skepticism of many psychiatrists who are dubious of the very existence of the disorder (Mai 1995), and the work of other researchers who have argued that it in fact is an *iatrogenic* disorder, produced by the procedures commonly used in diagnosis, in particular hypnosis (Spanos 1996).

Gail Macdonald was one of Seltzer's five cases, and *Making of an Illness* is an

account of her experience with one of the great tragedies of our time, False Memory Syndrome. It is a gripping account from the perspective of an ordinary person who was educated in the ways of therapeutic malpractice through her own tragic experience.

In the first couple of chapters she tells a tale of how, as the daughter of an alcoholic, she herself did not learn to cope well. Her own problems with alcohol and abusive relationships left her searching for help. Unfortunately, it came in the form of "Joe," the pseudonym she uses for the social worker who used "guided imagery" (a form of hypnosis) to lead her into the bizarre world of alter personalities. Going well beyond any of his formal training, Joe diagnosed her with MPD and began a treatment regimen. Macdonald demonstrates (supported by Joe's notes from her own case file) how her condition deteriorated rapidly as alter personalities were reified, and as her "support group" spiralled into what seems like a self-destructive competition for Joe's attention.

Macdonald describes how the seeds of doubt were planted, and the ways in which Joe tried to extinguish them by having her cut herself off from anyone who questioned his wisdom and her "disorder." Through a chance viewing of a *Sally Jesse Raphael* show on False Memory Syndrome, she contacted the False Memory Syndrome Foundation (FMSF). This awakened her to the extent of the problem that she faced, and began what she terms her "return to sanity."

She also has an interesting tale to tell about the notorious "McGill incident" in a chapter aptly entitled Women Against Women. In 1993, prominent psychiatrist Dr. Harold Leif, who was invited to deliver a public lecture on False Memory Syndrome at McGill University, was shouted down by a group of women, led by psychology professor Connie Kristiansen from Ottawa. Macdonald spoke about her harrowing experience the next day at the Montreal General Hospital, but was totally ignored by this group of women, as if her terrifying testimony did not count. She complains that Professor Kristiansen "did not seem to understand and even did not try to understand" the women who had discovered their memories to be false (so-called "retractors").

As Macdonald notes, the blatant disregard for the retractors is very painful to those who were the victims of recovered memory therapy. She also points out how this attack on women by women was later amplified by Kristiansen, who wrote an article (Kristiansen 1994) in which she insultingly refers to Macdonald and the others as women "who travelled with the FMS Foundation road show." Memories are never false, it seems, but retractions invariably are. Reading Kristiansen's article (available online) would be a valuable supplement to anyone who wants a feel for the more radical elements on the other side of this debate.

As Macdonald notes, the blatant disregard for the retractors is very painful to those who were the victims of recovered memory therapy.

Being swept up in the gender politics of our time is one thing, but taking action of one's own is quite another. Macdonald also tells us the story of her personal involvement in the first successful lawsuit against a therapist for this kind of misconduct in Canada.

This book does not pretend to be an academic text. Rather, it is a well-written personal account that incorporates what Macdonald has gleaned from scholarly information provided to her by those who recognized what had happened. She integrates it in an attempt to explain not only to herself but to the reader exactly what has gone wrong and why. Some may read it and take Joe's side, inferring from fragments of letters taken out of context that she really is a "survivor" who is now being revictimized by a patriarchy that supports her in her denial of what "really" happened. But I hope not.

While Gail Macdonald is still trying to rebuild her life, it would seem that writing this book has played a role far more therapeutic than the "journalling" that her alters did under the influence of Joe (who is now practicing in the U.S.A.). As Dr. Campbell Perry (professor emeritus of psychology, Concordia University) states in his foreword to her book, "It is distressing at times, but it has a happy ending." It stands as much as a testament to what should never happen in therapy as it does to the courage of a woman who exemplifies what Bertrand Russell called "the will to doubt."

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Travis Gee is a lecturer in the School of Psychology at the University of New England in Armidale, Australia. His Ph.D. comprehensive work was on False Memory Syndrome and he has recently co-authored an article on MPD/DID. *He wishes to thank Paula Tyroler for her invaluable assistance.*

NEW BOOKS

Listing does not preclude future review.

A Natural History of Rape: Biological Bases of Sexual Coercion. Randy Thornhill and Craig T. Palmer. MIT Press, Cambridge, Mass. 2000. ISBN 0-26220125-9. 251 pp. Hardcover. $28.95. This book created a firestorm of controversy well before its release in March. The authors, Randy Thornhill (a distinguished evolutionary biologist) and Craig Palmer (an anthropologist) use evolutionary biology to explain the causes of rape and to recommend new approaches to its prevention. They argue strongly that, in contrast to standard social science theory over the past twenty-five years, rape is in large part a biological-based behavior and is motivated, at least in part, by sexual desire. They show why and how rape can best be explained as an adaptation or a byproduct of adaptations passed down in many species through evolution by natural selection. Understanding this, they say, is the best route to prevention of a horrific behavior they would like to see eradicated. See also their article "Why Men Rape" (based on the book) in the January/February 2000 *The Sciences*, pp. 30–36.

Galileo's Commandment: 2,500 Years of Great Science Writing. Edited by Edmund Blair Bolles. W.H. Freeman, New York. 1999. ISBN 0-7167-3693-4. 485 pp. Softcover. $16.95. A treasury scoured from the literature of science of great explanatory writing in astronomy, biology, chemistry, geology, physics, and psychology by scientists over the millennia: Lucretius, Galileo, Darwin, Huxley, Maxwell, Mach, Einstein, Eddington, Haldane, Jeans, Carson, Eiseley, Asimov, Feynman, Sagan, and Gould are just a few of the writers here anthologized. The earliest is Herodotus (444 B.C., a geological analysis of the creation of Egypt); the most recent is George Smoot's "Looking for the Big Bang." Organized into three sections, The Scientific Imagination Examined, The Scientific Imagination in Action, and Style in the Scientific Imagination.

Magic in Theory: An Introduction to the Theoretical and Psychological Elements of Conjuring. Peter Lamont and Richard Wiseman. University of Hertfordshire Press, Learning and Information Services, University of Hertfordshire, College Lane, Hatfield, Hertfordshire AL10 9AD UK. 1999. ISBN 0-900458-93-3. 192 pp. Hardcover. £18.99. (North American edition available from Hermetic Press, $30.) Two academic psychologists who are both former magicians offer a book initially intended not for magicians but for psychologists and parapsychologists interested in deception and psychic fraud. It should help parapsychologists investigating the claims of psychics to be more aware of how they can be deceived by magic skills combined with a subject's understanding of their own science of psychology. The book opens with a chapter on "Magic tricks and how they are done" and goes on to chapters on misdirection, reconstruction, conjuring theory, and the difference between a magician and a pseudo-psychic.

Scientific Development and Misconceptions Through the Ages: A Reference Guide. Robert E. Krebs. Greenwood Publishing Group, 88 Post Road West, Box 5007, Westport, CT 06881. 1999. ISBN 0-313-30226-X. 296 pp. Hardcover. $49.95. (Phone orders: 1-800-225-5800.) A reference work and presentation on how humans have developed concepts to explain the myriad phenomena we confront everyday. The author traces the history of scientific developments and how misconceptions arose in explaining nature. Disproving, refuting, and, in some cases, building on these early developments and misconceptions is what science, with its unique self-correcting system developed over the past few hundred years, is about. Krebs says he hopes the book will assist people "in learning how to assess the many myths, legends, superstitions, beliefs, and misconceptions surrounding the sciences and pseudosciences from the ancient past to the present."

What Einstein Told His Barber: More Scientific Answers to Everyday Questions. Robert L. Wolke. Dell Publishing, 1540 Broadway, New York, NY 10036. 2000. ISBN 0-440-50879-7. 320 pp. Softcover. $11.95. More answers to common scientific questions ("What makes Day-Glo colors so bright? Why is glass transparent? Why do clothes wrinkle? Can you stand an egg on its end at the vernal equinox?") from the author of *What Einstein Didn't Know.*

—Kendrick Frazier

ARTICLES OF NOTE

Bloom, Floyd E. "The Endless Pathways of Discovery." *Science* 287:229, January 14, 2000. Bloom, editor-in-chief of *Science*, introduces a "Pathways of Discovery" series as part of *Science*'s yearlong special coverage of the transition into the next millennium. Each month the journal will carry an essay portraying the pathways of discovery in exciting areas of science. Each will be accompanied by a graphical timeline of major past events and agents of discovery. The first essay in the series is by Stephen Jay Gould (see below). The first timeline (pp. 230–231) portrays major discoveries (and some of the wrong turns) in science over the past 2,500 years.

Churchill, Martha A. "Junk Science Invades Psychiatry." *Detroit News*, January 7, 2000, p.13A. Churchill argues that before mental health professions can be granted parity for their treatment methods, they must "clean the junk science out of their closets." She says that there are a lot of "crazy fads" circulating among the mental health professions, and the "legislature should not grant parity to mental health providers who could use these fraudulent claims against unsuspecting patients."

"Combating the Exploiters of Creationism." *Nature*, 402:843, December 23/30, 1999. An editorial on the resurgence of creationism and a plea for scientists to "reach out, to become involved in local school-board issues and to seek election to ensure appropriate scientific curricula."

Gould, Stephen Jay. "Deconstructing the 'Science Wars' by Reconstructing an Old Mold." *Science* 287:253–261, January 14, 2000. In this provocative essay, Gould examines the human tendency to tell our explanatory stories as dichotomies, or contrasts between inherently distinct and logically opposite alternatives. The favored dichotomy today, he feels, features a "supposed battle called 'the science wars.' The two sides in this hypothetical struggle have been dubbed 'realists' (including nearly all working scientists), who uphold the objectivity and progressive nature of scientific knowledge, and 'relativists' (nearly all housed in faculties of the humanities and social sciences within our universities), who recognize the culturally embedded status of all claims for universal factuality and who regard science as just one system of belief among many alternatives, all worthy of equal weight. . . ." Gould feels these are false dichotomies. "All

these dichotomies must be exposed as deeply and doubly fallacious. . . . A science war can only exist in the minds of critics not engaged in the actual enterprise supposedly under analysis." Gould calls for a "commonsensical" attitude of "upholding, at the same time and without contradiction, both the continuous social construction and the growing empirical adequacy of scientific knowledge."

Kristoff, Nicholas D. "Alien Abduction? Science Calls It Sleep Paralysis." *The New York Times*, July 6, 1999. p.F1. "A growing number of scholars believe that sleep paralysis may help explain many ancient reports of witches and modern claims of abduction by space aliens," writes Kristoff. Scientists in Japan have long recognized this disorder, which they call *kanashibari*. One in two people are said to be affected by this disorder at least once in their lifetime. Americans' exposure to the supernatural, such as witchcraft and aliens, via movies and books increases their likeliness to report an abduction during sleep.

Machan, Dyan. "Bah, Humbug!" *Forbes*, March 6, 2000, pp. 94, 98–99. "Faith sells, cynicism does not," says Paul Kurtz in an interview with Machan about the increase in paranormal beliefs and the decrease in critical thinking and scientific thought in our country. Kurtz is the founder of the Council for Secular Humanism, "which promotes science and reason as the way to an ethical life," and the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), which Machan shortens to "science cops." CSICOP publishes the SKEPTICAL INQUIRER.

Ostler, Sarah, and Anna Sun. "Fetal Sex Determination: The Predictive Value of Three Common Myths." *Canadian Medical Association Journal*, 161(12):1525–26, December 14, 1999. The authors conducted an empirical study to determine whether three of the "old wives' tales" (the fetal heart rate test, the Chinese calendar test, and the Drano test) predicting the sex of an unborn child were scientifically accurate. They concluded that the tales' predictions were no more accurate than simple guesses.

Port, Otis. "Why Johnny May Learn to Add." *Business Week*, December 13, 1999, pp. 108–9, 112, 114. Four years ago in the Chicago suburbs, the First in the World Consortium (FiW) was founded. Its goal was to teach what is called "discovery learning, hands-on education, or inquiry-based

SCIENCE BEST SELLERS

Top Ten Best Sellers in **Oxford, U.K.**

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Simon Singh
Fourth Estate

2 ***Galileo's Daughter***
Dava Sobel
Fourth Estate

3 ***Just Six Numbers***
Martin Rees
Weidenfeld & Nicolson

4 ***The Nothing That Is***
Robert Kaplan
Allen Lane

5 ***The End of Time***
Julian Barbour
Weidenfeld & Nicolson

6 ***The Science of Discworld***
Terry Pratchett, Ian Stewart and Jack Cohen, Ebury Press

7 ***Walking With Dinosaurs***
Tim Haines
BBC Books

8 ***The Planets***
David McNab and James Younger
BBC Books

9 ***Ingenious Pursuits***
Lisa Jardine
Little, Brown

10 ***The New World of Mr. Tompkins***
George Gamow
Cambridge University Press

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teaching" to America's students in hopes of competing with other students around the world in math and science. The results for this type of teaching are in and are surprising many people, including FiW's founders. When the FiW students took several math and science tests, also given to students around the world, they scored among the top five countries across the board. Paul Kimmelman, head of FiW, is shocked at the results. "If you had said four years ago that we could match the Asian performance, I'd have said 'no way'."

Schilling, Govert. "Apocalypse, Not." *New Scientist*, December 15, 1999–January 1, 2000, pp. 36-39. Not about Y2K, but doomsayers' supposed apocalypse of May 5, 2000, due to an alignment of five planets, the Moon, and the Sun touted by writer Richard W. Noone in his recently reissued 1982 book *5/5/2000 Ice: The Ultimate Disaster*. (See News and Comment, this issue.) Actually the Belgian astronomer Jean Meeus, in 1961, was the first to point out the forthcoming planetary alignment, since latched onto by various pseudoscientific writers, but he did it in the context of merely noting a similar alignment expected in 1962, which "as far as we know," *New Scientist* points out, didn't cause Earth to fall over or Antarctica to melt. So the May 5 conjunction will not be rare or dangerous. But will it at least be spectacular? No. Because the Sun takes part in the cosmic gathering, the planets will be overwhelmed by its glare.

"Science and Pseudoscience." *American Psychological Society Observer*, July/August 1999, pp. 26–30. Last year, then-American Psychological Society president Elizabeth Loftus coordinated a "Presidential Symposium" in view of the fact that "pseudoscientific ideas are running rampant." Loftus organized this symposium to "illuminate these problems in hopes of fostering critical thinking, educating the public, and ourselves." Speakers included well-known researchers and scholars, such as Yale University's Robert Sternberg, Carol Tavris, and the University of Oregon's Ray Hyman.

Seitz, Frederick. "Decline of the Generalist." *Nature*, 403:483, February 3, 2000. "Few scientists under fifty are familiar with, or express much interest in, areas of research outside of their immediate professional concern," says Seitz, a former president of both Rockefeller University and the National Academy of Sciences. He argues that this is a result of three factors: the growing complexity of most fields of research, the intense competition in the workplace today, and, most important, the changing policies of our educational institutions as they deal with larger numbers of students with narrow ranges of interest. He believes that if reform began at the elementary and secondary levels of education, with the help of faculty and parental guidance, future generalists would emerge naturally.

***Sloan, R.P., E. Bagiella, and T. Powell.* "Religion, Spirituality, and Medicine."** *The Lancet*, 353:664–67, February 20, 1999. As public interest in alternative medicine increases, the authors question how much, if at all, should medicine address the issue of religion and spirituality and its place in the medical world. Their study concluded that "it is premature to promote faith and religion as adjunctive medical treatments." They also say guidelines for appropriate behavior are urgently needed.

—Jodi Chapman and Kendrick Frazier

Third International Skeptics Convention • University of Sydney
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The convention will focus on the three important human concerns that skeptics recognize as making paranormal, pseudoscientific and other irrational claims so attractive to so many people: Health, Wealth, and Wellbeing.

WEALTH — On **Friday, November 10**, the focus will be on dubious methods of separating people from their money. The lure of instant riches is a potent one, and many pseudosciences take advantage of that fact.

WELLBEING THROUGH CRITICAL THINKING — The key to wellbeing in a complex society is the ability to think critically. On **Saturday, November 11**, this topic will be addressed by an expert panel of scientists, philosophers and skeptics from around the world who will look critically at the wide range of issues that confront us as skeptics.

HEALTH — The 20th century is when the practice of medicine truly became scientific for the first time, but as we approach the 21st century we see an increase in support for unsubstantiated hold-overs from an earlier age. On **Sunday, November 12** we will hear from a distinguished panel of international speakers who will address what this means for our health as individuals and as a society.

Featured speakers include:

USA

Prof. Paul KURTZ, philosopher, Emeritus Professor at SUNY, in Buffalo, NY, founder and chairman of CSICOP, publisher of Prometheus Books, and a driving force behind of the modern skeptical movement.

Joe NICKELL, author of many skeptical books, magician and Senior Research Fellow for CSICOP.

Bob STEINER, accountant and magician. Author of *Don't Get Taken* and the original "Steve Terbot," a hoax psychic used by Australian Skeptics in our early days to get us noticed.

UNITED KINGDOM

Dr. Richard WISEMAN, Senior Lecturer in the Dept. of Psychology at the University of Hertfordshire. Richard researches parapsychology and paranormal beliefs from a scientific perspective.

AUSTRALIA

Prof. Mike ARCHER, Director of the Australian Museum, leading paleontologist and discoverer of the Riversleigh fossil beds in North Queensland. Australian Skeptic of the Year for 1998.

Prof. Simon CHAPMAN, University of Sydney. Prominent researcher in public health matters, including smoking and immunization issues.

Dr. Geoffrey DEAN, chemist and one of the world's leading investigators of astrology from a skeptical perspective.

Prof. Macieg HENNEBERG, University of Adelaide. Biological anthropologist, and anatomist who is researching human evolution.

Prof. Ray LOWENTHAL, University of Tasmania, oncologist and leading expert on quack cancer remedies.

Prof. Ian PLIMER, University of Melbourne, internationally renowned geologist and avid proponent of high-quality science education.

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Foxes and Hedgehogs

RALPH ESTLING

Archilochus of Paros, a Greek poet who, as literary folk like to say, "flourished" between 714 and 676 B.C., was known for his vituperative satire. The result is that only brief fragments of his poetry have come down to us. One very brief, and very ambiguous, line of his is *Frag. 103*: "The fox knows many things. The hedgehog knows only one, but it's a big thing." No doubt it loses a bit of its majestic quality in translation.

Gerald Fried

Scholars have, as scholars do, argued for centuries over the meaning. Of course, Archilochus was defining, and drawing a careful distinction between, the generalist and the specialist, the gifted all-rounder and the professional, specializing expert. The question is, which side is Archilochus on? Is he on *any* side? I haven't the foggiest idea. But I know which side *I'm* on and it's generally a good thing to talk and write about what you know about. This praiseworthy magazine devotes all its space, time, matter, and energy toward being doubtful about ideas expressed by people who only rarely know what they're talking about. It will never run out of material.

As examples of foxes the literary essayist Isaiah Berlin once nominated Herodotus, Aristotle, Montaigne, Erasmus, Shakespeare, Molière, Goethe, Pushkin, Balzac, and James Joyce. His hedgehogs were Plato, Lucretius, Dante, Pascal, Hegel, Dostoevsky, Nietzsche, Ibsen, and Proust. There is a third category, which Berlin doesn't mention because, I guess, it's so awfully rare, which includes people like Leonardo da Vinci, Michelangelo, and Thomas Jefferson, who combine in their natures both fox *and* hedgehog. Home run sluggers are strictly hedgehogs, while the little guys who regularly poke scratch singles through all parts of the infield, get to first base on bunts, and make it a habit to steal second, are your foxes. Babe Ruth was your quintessential hedgehog. Wee Willie Keeler, who "just hit 'em where they ain't," was your fox *par excellence*. Politicians and popes are almost always foxes, economists and saints almost without exception hedgehogs.

When it comes to science (and I'm coming to science, just be patient please), we have a menagerie that is almost entirely made up of hedgehogs. In the seventeenth, eighteenth, and early nineteenth centuries, before, that is, there were "scientists" (the word was only invented in 1840), there were "natural philosophers" and these were your archetypical foxes almost to a man, but that time is long past. Scientists are specialists now.

There are (or recently were) a few glorious, wondrous exceptions, like Richard Feynman, Carl Sagan, Richard Dawkins, and Murray Gell-Mann. They were able to unite hedgehog and fox into one stupendous, extraordinary, magnificent chimera that unified into a single, complete, breathtaking whole the best of both worlds, the specialist in A who is also the very knowledgeable generalist in B through Z, or at least through Q. But such people, like Leonardo, Michelangelo, and Jefferson, are rare as hen's teeth, as you would expect with wonders.

Most scientists are now mute, inglorious hedgehogs who know one thing, and are virtually totally unacquainted with anything else. This is because (rather

Ralph Estling writes from Ilminster, Somerset, England.

obviously) they must devote all their waking hours to their specialty if they are to have any hope to succeed in being, and staying, a specialist in these days of mindnumbing, overwhelming, incoming data. Do you know anyone who *really* understands computers who can locate his *gluteus maximus*, even with both hands and a road map? The nerd is always with us and his name is Expert.

Few of us are lucky enough even to be given the choice: fox or hedgehog, Jack-of-all-science, or Jill-of-the-microbiology-of-the-endomorphology-of-telomeric-chromatin. For those who have the choice and make one, the wise money and the tenure is with the Jills of this world. The Jacks will never get an article published in *Scientific American*, win a Nobel Prize, or be profiled by *The New Yorker*.

Things get worse. Even the man in the street will most often plonk for the narrow expert over the wide amateur. They assume that if only the world was run by experts we'd all be in paradise. The hell we would. And a very wise man named Gordon Drennan who's from Ultimo in New South Wales tells us why in a letter to *New Scientist*:

> Because experts focus on their own areas of expertise, they overestimate its value to the big picture. They overestimate its practicality and underestimate its cost and the problems it might involve. Like the man who only has a hammer, they try to use what they know and understand to solve every problem, regardless of other, more effective solutions. A world run by experts would be a disaster.

A world run by experts *would* be a disaster. Unless the hedgehog is also a fox, the specialist also a pretty fair generalist, Earth is doomed if ruled by experts. And if we can't have the combination of fox and hedgehog (and we almost certainly can't, it is much too improbable) and must choose only the one, let it be the good generalist, the all-rounder. The wise but limited amateur who knows his measure at least as well as he knows the measure of other men, including the experts, the scrappy lefthand hitter who knows how to knock the ball between short and third and deep into the left field corner when infield and outfield are all swung round way over to the right, the Wee Willie Keelers, rather than the mighty sultans of swat who know only one big thing, aim every swing for the bleachers, and so strike out ten times for every homer they hit.

Fox or hedgehog? Well, if I'm having brain surgery give me an expert brain surgeon, even if he's an ignoramus about everything else in the universe. But, if we aim to keep the world going a while longer, then allow me to opt for old Foxy Loxy every time.

Gerald Fried

Skeptical of Skepticism

DEBORAH FRISCH

All ten winners and fourteen runners up on the SKEPTICAL INQUIRER list of outstanding skeptics of the century (January/February 2000) are men. Only six of the total of seventy-four people who received votes are women. Why are there so few women skeptics?

Of course, a good skeptic must ask how likely it is that this observation is a "mere" coincidence. How likely is it that twenty-four randomly chosen people will be men? If we use the rough but reasonable approximation that 50 percent of people are men, then the answer is $(.5)^{24}$ or .0000006. The probability that a randomly chosen sample of seventy-four people will contain six (or fewer) women is 1.07×10^{-14}. It is exceedingly unlikely that these are mere (i.e., meaningless) coincidences.

One way to gain insight into why there are so few women skeptics is to look at the few women who were on the list. One of the six women named was Rachel Carson. Aside from Albert Einstein,

Deborah Frisch is in the Department of Psychology at the University of Oregon, Eugene, OR 97403, where for the last ten years, she has taught a course called Thinking. Her course, which was originally developed by Ray Hyman, emphasizes the need for a balance of skepticism and openness.

Rachel Carson is the only person listed who was also on *Time* magazine's list of twenty outstanding "Thinkers and Scientists" of the twentieth century.

Rachel Carson was not a typical skeptic. Most skeptics debunk the paranormal—Carson debunked the normal. Her book *Silent Spring* documented the negative effects of pesticides on the health of humans, other animals, and the environment. At the time, critics accused her of being "hysterical" for her radical idea that our attempts to modify the natural world might cause more harm than good. Thanks to her, what was once considered normal (i.e., indiscriminate use of pesticides) is now recognized as pathological.

Recently, Paul Kurtz wrote an editorial in *Free Inquiry* that is also skeptical of the normal. Kurtz's article, entitled "Confronting the 'Corporate Mystique'," is very critical of the increasing power of corporations in Western society. Just as Carson was skeptical of what was considered normal (e.g., use of chemicals to control nature), Kurtz is skeptical of what many people today consider normal (increasing corporate control and the assumption that unrestrained free market capitalism is desirable).

While Carson is the most famous of the six women who received votes, Susan Blackmore is the most well-known as a skeptic. Like Carson, Blackmore is not a typical skeptic. Most skeptics question everything under (and above) the sun except for skepticism. But Blackmore has pointed out the limits of skepticism. In a 1992 article in the SKEPTICAL INQUIRER, Blackmore defined a continuum of attitudes toward new ideas. At one extreme is the person who "enjoys every crazy theory and follows every faint lead." This person runs the risk of believing things that aren't true. At the other extreme is the person who "takes no interest in wacky theories and sticks only to the conventional." This person runs the risk of rejecting ideas that are true. Blackmore defines the "true skeptic" as someone who avoids both extremes.

Carl Sagan endorsed ideas that resonate with Blackmore's view of the true skeptic. In *The Demon-Haunted World* Sagan wrote, "As I've tried to stress, at the heart of science is an essential balance between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre or counterintuitive, and the most ruthlessly skeptical scrutiny of all ideas, old and new." Sagan is suggesting that skepticism alone is not sufficient to understand the nature of reality. Instead, he argues that skepticism must be combined with openness.

I would add a third feature to the definition of the true skeptic: she is just as skeptical of herself as she is of other people. This idea also resonates with the views of a man on the list of top skeptics, Richard Feynman. In an essay called "Cargo Cult Science" Feynman wrote, "The first principle [of science] is that you must not fool yourself—and you are the easiest person to fool."

Feynman's quote suggests that it is just as important for skeptics to be skeptical of themselves (e.g., question their motives, look for biases) as they are of other people. I think there is room for improvement here. For example, skeptics often accuse people who believe in holistic or spiritual claims of wishful thinking. Isaac Asimov is quoted as describing believers in the paranormal as needing ". . . a thumb to suck, a skirt to hold." Many skeptics do not seem to realize that they have an equally strong desire for holistic and spiritual claims to be false. A refreshing exception is Tom Gilovich, a frequent contributor to SI who admits that he hopes that psychosomatic explanations of disease are false. In *How We Know What Isn't So*, he writes, "Personally, I find it more comforting to believe that whatever crosses my mind will not affect my health (p. 142)." The point is that skeptics and believers are both susceptible to "wishful thinking" although of course, the two groups wish for very different things to be true.

In sum, an analysis of the views of some of the women on the list of outstanding skeptics of the twentieth century provides an opportunity to reflect on what it means to be a "true skeptic." The typical skeptic is skeptical of the paranormal, other people, and is not skeptical of skepticism. The true skeptic is skeptical of the normal (Carson, Kurtz), himself (Feynman), and of skepticism (Blackmore, Sagan). These ideas may seem heretical, but one might argue that skeptics should consider this a virtue. In a *Newsweek* article written shortly after Sagan died, Jerry Adler wrote, "A religion whose highest sacrament is heresy might have won Sagan's allegiance, but he never found one." I hope that there are more women and heretics on the SI list of outstanding skeptics of the twenty-first century.

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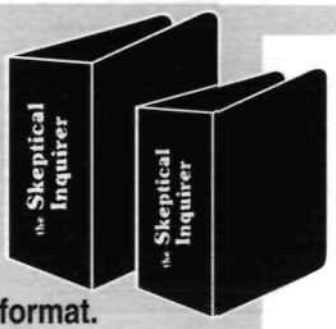

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The Power of Prayer

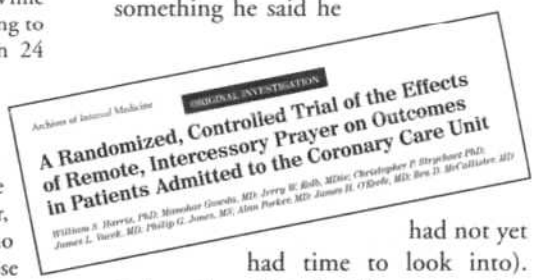
NICHOLAS HUMPHREY

In the March/April SKEPTICAL INQUIRER Tessman and Tessman (2000) suggest that the results of the study by Harris and others (1999) of intercessory prayer can be "well explained by chance." So we are invited to conclude that there was in fact nothing significant going on: neither God nor anyone else was biasing the outcome in favor of the prayer group. But they spoke too soon. For the truth is that hidden in the details of the original paper is statistical evidence that there was indeed *some kind* of intercession taking place.

In November 1999 a long report of this study appeared in *New Scientist* magazine, and I was provoked enough by it to take a closer look. Here follows a copy of the letter I had occasion to write to the editor a few weeks later:

> "Prayers can help patients recover even when they don't know people are praying for them, says a provocative new study" (*New Scientist*, 13 November, p. 24). But it turns out that hidden in the original paper that describes this study (*Archives of Internal Medicine*, 159, 2273) is a result that is even more curious: namely, that prayer works best of all before it has been started!
>
> The paper reports the following facts without comment. "1,013 patients were randomized, 484 to the prayer group and 529 to the usual care group. After subsequent removal of those patients who spent less than twenty-four hours in the Coronary Care Unit [because it took a day to get the prayers up and running], 524 remained in the usual care group and 466 in the prayer group."
>
> But look at these figures. While 18 of 484 patients who were going to be prayed for got better within 24 hours, only 5 of 529 patients who were not going to be prayed for did so. This difference is significant at p<.001 by a chi-squared test. By contrast the main effect reported in the paper, namely that among patients who stayed more than 24 hours those who were prayed for had better clinical outcomes than those who weren't prayed for, only just makes it to the p<.04 level.
>
> So it seems that either the study has come up with strong evidence of prayer producing *backward causation* of recovery, or else that there was something wrong somewhere with the way the study was conducted (e.g., that, despite the claim of randomization, less sick patients were in fact being assigned to the prayer group). Readers should take their pick of these two interesting alternatives.

I sent a copy of my letter to the first author of the paper, William S. Harris. He acknowledged, in a courteous reply, that these numbers were somewhat puzzling. But he moved to head off my veiled accusation (that someone involved with the study had deliberately tried to rig the results by assigning less sick patients to the prayer group) by reminding me that I was making an unwarranted assumption: namely, that those who left the unit within twenty-four hours had indeed got better—when in fact they might have died (this is something he said he


Archives of Internal Medicine

ORIGINAL INVESTIGATION

A Randomized, Controlled Trial of the Effects of Remote, Intercessory Prayer on Outcomes in Patients Admitted to the Coronary Care Unit

had not yet had time to look into). Point taken. If it should turn out that patients who were assigned to the to-be-prayed for group were actually significantly more likely to die within twenty-four hours, the implications of this study would surely be more interesting still.

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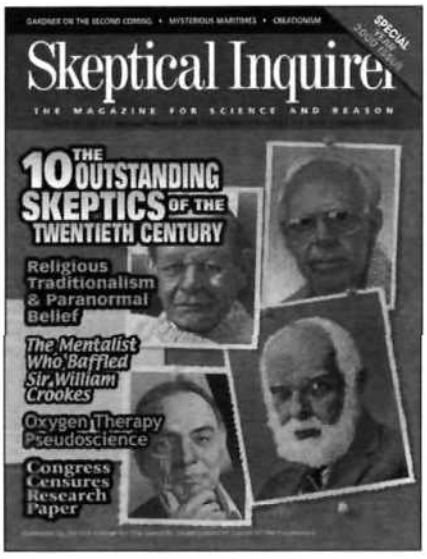
'Top 10 Skeptics' List Generates Controversy


Skeptical Inquirer
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THE 10 OUTSTANDING SKEPTICS OF THE TWENTIETH CENTURY
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Congress Censures Research Paper

The article "The 10 Outstanding Skeptics of the Twentieth Century" (January/February 2000), includes Harry Houdini (1874–1926) but somehow omits one of his contemporaries, Clarence Darrow (1857–1938), who devoted so much of his time to exposing ignorance, including his cross-examination in the Scopes trial of 1925 in which fundamentalist William Jennings Bryan revealed the bigotry and lack of intelligence of the "true believers."

All due respects to Darrow, one of the greatest of all time was Col. Robert Green Ingersoll, who just missed the twentieth century as he died in 1899. Ingersoll's writings and books reveal a truly great man.

Patrick J. Leonard, Sr.
Braintree, Massachusetts

Missing from the list of outstanding skeptics of the twentieth century is Bergen Evans, author of two early skeptical books: *The Natural History of Nonsense* in 1946 and *The Spoor of Spooks and other Nonsense* in 1954, both published by Knopf. But Evans's influence far exceeded these two books.

In the late 1940s he taught the most famous course at Northwestern University. One did not take English B1; one had the privilege of taking Bergen Evans along with more than 500 other students. His skeptical attitude toward people's foibles found a resonance in world literature, and with erudition and wit he enlivened literary works while instilling a questioning attitude in many students, including myself.

Some may remember Bergen Evans as the quizmaster on the early television show *Down You Go*, in which clues were presented as puns and other tricky devices. He chose to regard viewers as alert and intelligent.

Everyone may learn from Bergen Evans by referring to his valuable reference *A Dictionary of Contemporary American Usage*, co-authored with Cornelia Evans and published by Random House in 1957. The volume remains an authoritative, unpedantic resource to practical American usage that is informed by Evans's vast scholarship and enlivened by his wit.

Bruce Martin
Earlysville, Virginia

Shame on you narcissists! For the top ten skeptics of the twentieth century you choose seven of your own contemporaries, emblazon your cover with their pictures, and then patronize the past by naming a couple of famous figures. Not acceptable! Your panel should have done more homework on the history of skepticism.

How, for example, could you fail to include the Oxford-educated Perry Mason of serious spiritualistic debunking, Frank Podmore? His two-volume scholarly work on *Modern Spiritualism* (1902—yes, that's twentieth century) was seminal in getting the premier issue of the day in all of occultism before the public at a real crisis point. (See my *Behind the Crystal Ball*, pp. 198–200 for a brief account of his worthy contribution to your skeptical movement.)

Anthony F. Aveni
Professor of Astronomy
and Anthropology
Colgate University
Hamilton, New York

. . . That list, intended to be CSICOP's celebration of "skepticism," turned out to be CSICOP's celebration of itself. It displays an appalling ignorance of the history of skepticism in this century.

To begin, seven of your "winners" (all CSICOP founders) were or are active in the final quarter of the century, and five are currently alive. Like the voters for the Academy Awards, who rarely select films released early in the year, your voters had great difficulty casting their critical eyes back to the beginning of the century. Furthermore, all but two (the unavoidable Russell and Einstein) were or are Americans.

Your list is remarkable for its exclusions. Four of your "next ten" deserved better: Feynman, Mencken, Dawkins, and Gould. In addition, the following individuals come to mind, each worthy of a place at the top of the list: George Santayana (author of *Skepticism and Animal Faith*), Clarence Darrow, the Positivists A.J. Ayer and Moritz Schlick, the Christian Skeptics James Robinson and James Pike, philosophers Antony Flew and Thomas Nagel, the existentialists J.P. Sartre and Albert Camus, activists Lincoln Steffens, Margaret Sanger, and Noam Chomsky, environmentalists Rachel Carson, Paul Ehrlich, and Garrett Hardin. Among the Russians, one might consider Andrei Sakharov and Mikhail Gorbachev, or the writers of the *samizdat* political tracts such as Sinyavsky and Daniel, all of whom challenged Marxist dogma and practice and thus helped to overthrow Communism. . . .

Ernest Patridge
Cedar Pines Park, California

"The Ten Outstanding Skeptics of the Twentieth Century" is a fatally flawed article lacking even the most basic information on its underlying survey, e.g., how many of the CSICOP Fellows and Scientific Consultants responded. Nor is the technique of combining the lists—some apparently consisting of the requested ten, some far lengthier—included.

While "[t]he main interest here is not in ranking people in comparison with each other," there is no explanation of the sequence in which the names appear. What is clear from the four lists is that the customary way of avoiding implied rank, alphabetization, was not used.

Far worse is the fundamental assumption that in late 1999 *anyone* has the perspective to list in any meaningful fashion "the outstanding skeptics of the twentieth century." At this time it would be reasonable to survey—and report with at least minimal attention to scientific writing standards—the outstanding skeptics of the nineteenth century, or possibly of 1850–1950. . . .

Charles Peyser
Sewanee, Tennessee

. . . How can anyone give a rank amongst the skeptics of our century? They have not been working in the same field. Some have fought the faith-healers, some have battled against the UFOlogist fantasies, some have been

kept debunking astrology, or homeopathy. The ordering of these good people is entirely subjective. And then why do you insist on the ten "outstanding" ones out of whom one only has been living really in the USA, namely Bertrand Russell? . . . The USA! . . . A country where irrational tendencies are worse than anywhere in the developed world! You are living in a glass house, gentlemen. . . . Aren't you?

How can anyone be confident in the choice of "an elite group" of unnamed "scholars"? Any jury of any prize is always known to the public. . . .

In the list of "other persons," I found a single French name, that of Simone de Beauvoir. She indeed fought for human rights, and in particular for the rights of women; but she never said a word about uncontrolled beliefs! . . . Has not anyone in the USA ever heard of Jean Perrin, Paul Langevin, and Alfred Kastler, all Nobel Prize recipients? And many others? This list, which pretends to be international, is indeed badly biased! . . .

Jean-Claude Pecker
Paris, France

Your choice to run an article on "The Ten Outstanding Skeptics of the Twentieth Century" nearly convinced me to cancel my subscription. I had long ago grown tired of your fawning over Martin Gardner (I admit I read the description of Gardner—to see if, as usual, you would use the word "polymath" or a variation thereof. Of course you did. I have nothing against Gardner—but I am entirely against your worshipful treatment of him.) Fortunately for your organization, as I walked toward the trash can, I glanced at a couple other articles and remembered why I subscribe to your magazine.

I'll continue my subscription for now. But I'd appreciate it if you'd quit the hero-worship. It would have been much more interesting if you had run an article on the top ten investigations of claims of the paranormal. . . .

Gam Dykstra
Department of EPO Biology
University of Colorado
Boulder, Colorado

I'm surprised. Your CSICOP Fellows and Scientific Consultants were able to find among their own number only seven twentieth-century skeptics more outstanding than Bertrand Russell, Harry Houdini, and Albert Einstein. There have to be at least another three CSICOP associates whose skepticism has been more important than that of Russell, Houdini, and Einstein. I fear that your panel wasn't trying very hard.

Bill Wisdom
Bryn Mawr, Pennsylvania

As with so many of the popular "lists" of the twentieth century (inventions, authors, films, etc.), your article will probably generate criticism. Since "nearly fifty different individuals received at least one vote," I was surprised by the absence of two prominent skeptical women. Ayn Rand and Madalyn Murray O'Hair both distinguished themselves as outspoken opponents of the status quo and in doing so, have become famous in spite of your neglect.

More women were obviously needed to balance the list.

George Dunbar
Toronto, Ontario

My first copy of SKEPTICAL INQUIRER honors the "Ten Outstanding Skeptics of the Twentieth Century"—all men. Evidently you are not aware that the most skeptical people in every society have always been women! We are skeptical not only about religions but about the whole male chauvinist establishment. Will men ever learn? We doubt it.

Margaret K. St. Clair
Ashland, Oregon

Are Religious Beliefs and Paranormal Beliefs Correlated?

Erich Goode's article on the relationship between traditional religious beliefs and paranormal beliefs (January/February 2000) gives me some encouragement that scholars will devote more attention to this important topic. However, I think future efforts should seek to address several limitations in Goode's approach:

1. The four questions that Goode selected to indicate traditional religious or fundamentalist belief must be questioned on the grounds of construct validity. There is good reason to suspect that many traditional Christians would disagree with three of the four statements. First, much of the rhetoric of traditional Christianity is directed against "salvation by works" which is implied in the statement that "there is a heaven where people who live good lives are eternally rewarded." Similarly, many Christians would not assert that the devil is a "physical" being. Instead, they would assert that he is a "spiritual" being. Finally, the view that God created Earth in six days within the last 10,000 years is only a very recent (twentieth century), interpretation of the Bible that many Christians reject—or at least express uncertainty about. In the end, to the extent that Goode's data show any relationship between these four items and paranormal beliefs, I am not sure we learn very much about how traditional religious beliefs are related to paranormal beliefs.

2. The real interesting question about traditional religious belief and paranormal belief is the *extent* to which they are related. Goode reports that correlations were computed between the various pairs of items, but these correlations were not reported. Even if the correlations were as high as .30, it would still indicate that roughly 90 percent of the statistical variance in the measure of any given religious item was unshared with the paranormal item. The fact that most of the relationships reported were statistically significant tells us little about the strength of the relationship between the two measures. With large samples, very tiny statistical effects can be significant.

In the final analysis, I am not at all convinced that Goode's data contradict earlier work that shows little relationship between traditional religious belief and belief in the paranormal. We almost certainly need more research on this question before we reach a definitive conclusion.

Glenn Sparks
Professor of Communication
Purdue University
West Lafayette, Indiana

Professor Goode presents a compelling case for the relationship between the beliefs of religious traditionalism and those of paranormalism, and his efforts deserve our attention. As a researcher, however, he must know that inferential statistical methods do not measure the significance of research results; they do estimate how probable it is that what was found in the samples holds true in the population from

which those samples were drawn.

Even so, the size of the effect, or in Professor Goode's study, the degree of the relationship, in the population may or may not be what it was found to be in the sample. The most that can be said is that there probably is some relationship, or that it would be rare to obtain such results if, in fact, there is no relationship in the population from which the sample was drawn. Such a statement as ". . . an *extremely* high level of significance" is inappropriate in the context of inferential statistics. Furthermore, Professor Goode ought to be mindful of the fact that this was not a random sample and that, therefore, his findings can be applied only to certain undergraduate populations who attend the State University of New York at Stony Brook. Professor Goode's analysis of his sample's characteristics has more to do with reconciling the contradiction between his results and those of previous research than with the representativeness of his sample.

Joseph S. Attanasio
Department of
Communication Sciences
and Disorders
Montclair State University
Upper Montclair, New Jersey

Erich Goode's article claims that there is a "significant, strong, and positive relationship" between religious fundamentalism and belief in the paranormal. That is, fundamentalists tend to agree with statements about the paranormal to a greater extent than do those who disagree with items measuring fundamentalism. Unfortunately, Goode chooses to ignore the responses of individuals who state that they are "not sure" about fundamentalist issues.

Examining those who are not sure about fundamentalist questions paints a different picture. For many of the paranormal questions, those who agreed with the fundamentalist statements responded similarly to those who indicated that they were not sure about the fundamentalist statement.

Since the author ignores these data, the conclusion is flawed. Those who aren't sure about certain religious ideas also believe in the paranormal. If both those who endorse fundamentalist items and those who are unsure respond similarly, then fundamentalism cannot be driving the endorsement of paranormal beliefs.

Furthermore, those who were unsure about questions of Christian faith could be considered to be "non-fundamentalists." Allowing for the classification of these individuals as "non-fundamentalists" would weaken conclusions regarding fundamentalists versus non-fundamentalists considerably.

Chris Aberson
Department of Psychology
Franklin and Marshall
College
Lancaster, Pennsylvania

Professor Goode's comparison of religious beliefs with acceptance of the paranormal was an excellent examination of an important question about what people believe. While reading the article, however, I was disappointed to learn that the survey respondents were undergraduate college students.

In his review of *The Importance of Psychological Traits: A Cross-Cultural Study*, Adam Kuper observed, "Psychology has traditionally relied on the empirical study of two populations: American students and laboratory rats. Even today, students are the usual subjects for studies of attitudes, the staple of soft psychology. But there are evident problems of representativeness. The particular attitudes of American students are very possibly due to their being American, or to being young, or students, or even to being students of psychology. Are they a reliable guide to the psychological attitudes of Americans in general?

I believe these same questions could be be raised about almost all surveys that use any variety of college student in an attempt to investigate the attitudes of the population at large. Although I admit to having no studies of my own to validate my thoughts in this regard, can there really be very many people who think college students fairly represent American society as a whole, especially in matters of belief about the supernatural? I realize that Goode attempted to address this criticism by referring to Bainbridge and Stark's work, but it seemed like a feeble defense, at least as it was presented in his article.

I suspect Professor Goode's conclusions are applicable to American society as a whole, although I doubt that the correlations are as strong as in his survey group. It would be nice to *know*, however, and the only way that will happen is if a similar survey is conducted using a truly fair and representative sample of our populace.

John O. Stewart
Leadville, Colorado

One reason that Erich Goode finds a relationship between religious belief and belief in the paranormal while other researchers have not, and one he does not discuss, is that there may be flaws in his study. I offer some possible ones, from the trivial to the serious:

Probably trivial: Offering the choices "Astrology is: Very scientific, Somewhat scientific; Somewhat unscientific . . ." would be improved by using "mostly" instead of "Somewhat," which can imply the reverse. "Somewhat scientific" can mean a thin shell of science over a lot of claptrap and "Somewhat unscientific" can mean there is only a small flaw in the study. Since the terms are given in an order, the reader should have gotten the intended meaning, but "Mostly" still would have been a better term. . . .

Possibly serious: Of the religious questions asked, only the Bible story of creation really ranks as an identifier of fundamentalism. The others do not require any serious belief, and may misidentify the subjects. Notably, the Bible question has the weakest relationships, including the only sharply reversed one.

Possibly very serious: Goode mentions he asked eight religious questions and eleven paranormal questions, and presents data from four religious and five paranormal. There can be adequate reason for this, but it is highly likely the sixty-eight tables not presented would not show nearly as "convincing" a case. Many a researcher has found when he looked a second time that he had found a new way to mine the data rather than real support for his theory.

A test Goode might make, and may have made, is to check some of the other relationships. If there are other "surprising" results, it may be time to wonder if this was in fact a valid set of subjects.

Being a skeptic does not stop one from wanting to be right, and so we must be skeptical about results that we find appealing.

David Argall
La Puente, California

Erich Goode responds:

The letters to SI and the e-mail messages I've received about "Two Paranormalisms or Two and a Half?" seem to indicate that it raised and discussed issues that interest the skeptical community. Not all the criticisms of the survey on which it is based or of its arguments are on target, however. Some readers had a problem with the sample, others with the indicators. To the readers who object to the study's sample (a

"chunk," really) of college students, my response is twofold.

First, as I stated explicitly and repeatedly, this study is exploratory and its findings are suggestive. The article's subtitle states that the study is an empirical "exploration." The language of its thesis is likewise tentative: "I suggest" (twice), "I am suggesting" (p. 31). I also state that there may be analytically and empirically separate dimensions of both religious and paranormal expression (p. 34), and that sample differences between other studies and mine might account for the differences between their findings mine (pp. 34–35).

Second, I would loved to have conducted the study using a representative sample; perhaps one day I shall. Given the fact that the research budget for this survey was exactly zero, I am pleased that I was able to conduct it at all. To claim that these findings "can be applied only to certain undergraduate populations . . ." (Attanasio) is simply untrue. (Most *correlations between variables found in one population obtain in other populations.) I agree with Stewart, however: If a survey of the population at large had been conducted, the correlations I obtained would still prevail, but they probably would be weaker. Any suggestions regarding what agency would fund a nationwide study on this topic? I welcome them.*

Aberson faults the use of "not sures." This is a bogus problem. Fundamentalism is a dimension. Every question is an indicator, not an absolute test. Every question will elicit some respondents who agree, some who disagree, some who aren't sure. For each respondent, not every "agree" on one question will be an "agree" on every other, some will not be a "not sure." This is survey methods 101. I don't see the problem because it doesn't exist. I agree with Sparks that more research is needed; the primary goal of my article was an attempt to stimulate that research. I agree that the correlations I obtained indicate a strong measure of unshared territory between fundamentalist religious belief and paranormalism. (Note, however, that my sample is not large; its N is under 500.) But given the negative correlation that prevails in the current literature, the fact that I obtained a positive correlation at all *is remarkable.*

It's also possible that there is some non-overlap between "traditional" Christianity and fundamentalist *Christianity. As the language of my argument makes clear, I focus on fundamentalism. Hence, the issue of salvation, and consequently that of "construct validity," is irrelevant. Argall's criticisms range from "possibly trivial" to more serious. I agree that his objection to the astrology question is trivial. I asked two questions on astrology, one (the one I presented in the article), a dimension, the other, a forced choice. Both displayed the same correlation with paranormal belief. Same correlation, same relationship. I agree, however, that I selected key questions to test the relationship. I asked many other questions; most displayed the same relationship, a few did not. Given the fact that I am wary of collapsed indicators constructed of many questions, I was forced to choose a small number of questions to test my hypothesis. This article is not the final word on the subject. In a future work, I intend to broaden the analysis both as to the indicators I use and the sample I draw. I too am "skeptical" of the results I obtained. But I feel* fairly *confident that the indicators I used are reliable and the findings I obtained are valid. Still, I look forward to the findings of other researchers who wish to investigate same relationship. Perhaps Attanasio, Aberson, Stewart, Sparks, or Argall are willing to step forward and take up the challenge.*

Congressional Censure of a Research Paper

The commentary "The Congressional Censure of a Research Paper: Return of the Inquisition?" in your January/February 2000 issue is agendized mumbo jumbo. Instead of addressing the validity of the congressional condemnation of the American *Psychological Bulletin* (APB) article or the APB attempt to legitimize pedophilia, I believe the authors introduced unrelated and extremists analogies to attack Congress, Christians, and whoever opposed the APB position. I became a subscriber to your magazine because I believe in the scientific approach in explaining our physical, psychological, and social environment, but this article exposed a compromised and agendized approach that I find totally unacceptable.

Please cancel my subscription and refund whatever is left of my subscription money.

Ralph Sutter
Pahrump, Nevada

This piece was unworthy of your publication, being no more than a rant by two hysterics with axes to grind. Using "evidence" that doesn't even come close, they claim that the US Congress is about to unleash the forces of "totalitarianism" onto the scientific community, burning books and terrorizing scientists. All this commotion over some politicians' reaction to a paper in the journal of American Psychological Association.

Sorry, it doesn't add up. In fact, the authors' wild overstatements explode their own case, leaving the reader wondering who the real fanatics are. Imagine, equating political hot air over a psychology paper to Galileo's persecution by the Inquisition. What hubris. . . .

Wim de Vriend
Coos Bay, Oregon

As a psychologist I have provided assessment and treatment services to over 275 victims of sexual abuse, both male and female, over the past two decades, as well as roughly the same number of sex offenders over the same time period. When I read the Rind, Tromovitch, and Bauserman review article in the July 1998 *Psychological Bulletin* implying that sexual abuse may not be as harmful as heretofore considered, I was concerned. The difficulties with the evaluation are many and cannot be adequately addressed in a short letter to the editor. However, even the abstract for the examination clearly states: "Many lay persons and professionals believe that child sexual abuse (CSA) causes intense harm, regardless of gender, pervasively in the general population . . . meta-analyses reveal that students with CSA were, on the average, slightly less well adjusted than controls. However, this poorer adjustment could not be attributed to CSA because family environment (FE) was consistently confounded with CSA . . . negative effects were neither pervasive nor typically intense . . . basic beliefs about CSA in the general population were not supported." It is not surprising, then, that public officials and many in the sexual abuse field were concerned about the report.

On March 23, 1999, the American Psychological Association reiterated its position that "the sexual abuse of children is wrong and harmful to its victims" and added that "the facts are that the majority of the psychological literature reveals that childhood sexual abuse has serious and long-term negative effects on its victims." It continues, "No responsible Mental Health organization, including the American Psychological Association, endorses paedophilia or denies its negative effects on children. Any statement that suggests otherwise is a serious distortion of the truth." Indeed, a 1996 meta-analytic review of the relationship between CSA and psychological difficulties conducted by Newman, Houskamp, Pollock, and Briere found a significant association between a history of

CSA and adult symptomatology. The Newman et al. findings are consistent with literally hundreds of studies detailing the adverse consequences of child sexual abuse often lasting well into the adult years.

Claims pertaining to astrology, UFOs, "creation" science, and perpetual motion machines are properly greeted with skepticism as they fly in the face of established science. The Rind et al. article also flies in the face of available research and deserves skeptical review.

G.W. Lea, Psy.D.
Registered Psychologist
Kelowna, B.C., Canada

I found the commentary regarding congressional censorship of a scientific study to be frightening. Particularly since the congressional vote was unanimous to condemn and censure a scientific publication. As the article points out, the next step to the control of science is "official censorship" by government bodies or committees.

What really bothers me is the fact that not one congressman had enough courage to stand up and dissent from the opinion of the "herd." The spirit of Patrick Henry, i.e., "give me liberty or give me death," is sadly missing in this day and age. Unfortunately, Nietzsche's philosophy regarding the "herd instinct" seems to be alive and well.

Robert J. Tripician
Virginia Beach, Virginia

In the January/February 2000 issue I found reported the release of Cheryl Amirault LeFave (p. 6), the loss of license of Bennett Braun (p. 7), and the censure by the U.S. House of Representatives of the publication of "A Meta-analytic Examination of Assumed Properties of Child Sexual Abuse Using College Samples" (p. 20). What I did not find was any reference to how these events are connected. What is it that led 355 Representatives to censure the publication of a serious scientific study? Was it not the irrational beliefs about the horrific consequences of child-adult sexual encounters engendered in the American public by the consequences for patients of the actions of therapists such as Bennett Braun, and by the testimony elicited from children by those who prosecuted cases such as the one against Ms. LeFave?

As yet the American public does not realize that the events recounted by the children in the child abuse/satanic ritual trials were the fantasies of adult therapists and prosecutors, nor that the horrible consequences for "survivors" were the consequences of therapy, not the consequences of childhood sexual encounters. Until the actual effects of child-adult sexual encounters are contrasted with the effects prosecutors and therapists imagine, irrational fears will continue to harm those accused of child sexual abuse, those who have had sexual activities while children, and all of us who wish to know the truth about our world.

Who better to investigate and correct the record than SKEPTICAL INQUIRER?

Bernard Davis
Associate Professor
Faculty of Education
Saint Mary's University
Halifax, Nova Scotia

Oxygen Therapy Pseudoscience

May I call to the attention of SI readers that in the recent past, the subject of the pseudoscience associated with use of oxygen therapy has been extensively reviewed in two other CSICOP journals. Those papers were not referenced in Dr. John M. Allen's paper (SI, January/February 2000, p.40). In order that SI readers may have a complete picture on this subject, I wish to present the references to those papers here:

1) *Nutrition Forum.* 13(2), p. 13, 1996
2) *Nutrition Forum.* 13(3), p. 25, 1996
3) *Scientific Review of Alternative Medicine* (*SRAM*). 2(1), 1998, pp. 6–13.

Saul Green, Ph.D.
Science Editor, *SRAM*
New York, New York

I enjoyed Allen's article, but he needs to be more careful about his terminology.

Hyperbaric oxygen therapy is the use of oxygen under increased pressure, not necessarily at increased concentrations. It is used to treat decompression sickness and certain infections, as opposed to the use of oxygen at increased concentrations, which is used commonly for conditions such as those involving the lungs and heart.

William Hay, M.D.
Assist. Professor of Family Medicine
Univ. of Nebraska Medical Center

Special Theory of Relativity Doesn't Say That

Concerning the Forum column "A Not-Very-Loudly-Sung Hero" by Ralph Estling in your January/February issue, I would like to take issue with the assertion that Einstein's Special Theory of Relativity can be summed up by the statement, "Two events occur that appear to be simultaneous to an observer located halfway between them, but to another observer who is nearer one of the events, that event appears to happen before the other." The quoted statement, while true, sayings nothing specific to the Special Theory, greatly trivializes what Einstein accomplished, and makes me seriously wonder whether Estling understands the Special Theory. Indeed, anyone who knows that light has a non-infinite speed would trivially realize that the nearer of two simultaneous events would "appear" to happen before the other. But as Minkowski's "objective, external, universal" spacetime makes clear, Einstein's theory is not about appearances. The hypothetical observer, being knowledgeable about the speed of light and the distance to the two events, could easily infer that the events were simultaneous within his frame of reference, no matter where he was located. What Einstein's theory does show, and what is much more profound, is that another equally competent observer in a different reference frame moving relative to the first would conclude that the same two events were not simultaneous.

The essence of Einstein's Special Theory is in his Principle of Relativity, namely that all inertial (non-accelerating) frames of reference are equivalent for all laws of physics. That principle was implicit in Newtonian mechanics but appeared to be violated when mechanics was combined with Maxwell's theory of electromagnetism. Einstein's genius was to realize that the principle *must* apply to all laws of physics, even though that required him to modify classical mechanics and our notions of space, time, energy, momentum, and mass.

Minkowski's contributions were important, but I don't think that they go unrecognized. In fact, in the textbooks on relativity that I am familiar with the formalism of four-dimensional Euclidean space-time (that is, in the absence of gravitational curvature) is called "Minkowski space." As Estling correctly indicates, Einstein's crowning achievement was to work out the implications of extending the Principle of Relativity to the more general Equivalence Principle, which

resulted in his theory of gravity and necessitated a non-Euclidean (i.e. "curved") spacetime. Minkowski's contributions were a necessary precursor to that work.

Robert P. Johnson
Associate Professor of Physics
University of California at Santa Cruz
Santa Cruz, California

Ralph Estling rightly praises the great mathematician Hermann Minkowski as the originator of the modern view of spacetime. However, his capsule version of relativity theory is unfortunately wrong.

His "summary" is a completely trivial observation that is true whether your physics is Newtonian or relativistic. If the two observers are at rest relative to one another, then Special Relativity says that both count the events as simultaneous; the position of the observers is irrelevant.

Readers who want an accessible introduction to relativity theory can study the original works, including Einstein's great piece of 1905 and Minkowski's famous address of 1908, "Space and Time," in the Dover paperback *The Principle of Relativity.*

Alasdair Urquhart
Department of Philosophy
University of Toronto
Toronto, Ontario

Ralph Estling replies:

My thanks to professors Johnson and Urquhart (and others) for pointing out that my summation of the special theory was a bit too summary, seeming much more dismissive than intended. Of course there is a great deal more to special relativity, such as the counterintuitive fact that the velocity of light is perceived to be the same by all observers, regardless of their own speed and direction of motion. I was drawing my comments largely from Einstein's own presentation of the train-hit-by-lightning analogy as it appears in his short book Relativity: The Special and the General Theory, *published in 1920, in which he describes special relativity in very simple, almost offhand, terms, showing how one event may appear variously to various observers in varying coordinate systems. While this is extremely interesting and important it does not describe the objective, external event itself, merely the intermediary interpretations of this or that observer in this or that inertial frame. Knowing how things appear is important. But more important is knowing how things* are. *The devil of course is in the exegesis.*

Review of 'Race and IQ'

It's too bad that the first issue of SKEPTICAL INQUIRER in the new century contains a book review of the kind provided by Grant Jewel Rich (*Race and IQ: Expanded Edition*). I fervently hope that readers of the review who are not familiar with modern research on intelligence will consult other sources as well. If they do, they will see how extreme and unwarranted the views provided by Mr. Rich are, and they will quickly come to understand some of the problematic aspects of the contents of this book, Mr. Rich's unreserved approbation notwithstanding.

Most important, SI readers who do more reading about IQ will also find out that there *is* a real analytical and empirical science of intelligence, one that is now making contact with brain science—as, for example, in the replicated finding of a positive correlation of gray-matter volume and mental ability test scores. And they will also find out that IQ researchers and theorists whose work is attacked in this review and in this book are not crypto-Nazis; they are empirical scientists (male and female, Jew and Gentile) who have been *led by research results* to the conclusions that measured intelligence is a profoundly important trait that displays significant heritability.

If research on intelligence leads to socially or morally disquieting possibilities, it is hardly alone among sciences in this regard. It will be amazing if all of our current sensibilities and beliefs turn out to be completely consistent with the eventual products of science.

Stephen Madigan
Associate Professor
Psychology Department
University of Southern California
Los Angeles, California

In his review of Ashley Montagu's *Race and IQ: Expanded Edition* in the January/February issue, Grant Jewell Rich laments that books rebutting *The Bell Curve* did not sell nearly as well as *The Bell Curve* did. We have an object lesson here. Mr. Rich's references to *The Bell Curve* are very similar to those in early reviews of the book—reviews whose tone of intellectual desperation prompted many of us to go and buy the book to see what it was that the reviewers were so unable to cope with.

It simply will not do to try to define race out of existence (a quick exercise: Assume there are no biological races. Now: among what subgroup of the population is the incidence of sickle-cell anemia greatest?) It will not do to try to answer Herrnstein/Murray's argument that recent changes in IQ tests to accommodate perceived racial and ethnic bias have been ineffectual by rehashing the misuse of tests in the 1920s. (There may indeed be a valid rebuttal to this argument somewhere, but no review I have seen has stated it nor told me of a book or article containing it.) It will not do to impugn sources by alleging racist connections unless the material itself can be criticized. And faulting the book's politics (the authors were at pains to be non-political, but as Murray correctly foresaw, to no avail) has nothing to do with the book's findings.

There is, of course, a very serious real-world issue with *The Bell Curve*: its arguments *can* be horribly misused for the most evil of purposes; there is certainly sad precedent for that. But I would have hoped that SI would insist that this is a separate area—I am almost tempted to say "non-overlapping magisterium"—from the science, good or bad or both, of *The Bell Curve.* It is simply anti-scientific to try to duck a scientific issue of the basis of the inconvenience, however real, of a possible outcome; I happen to think a case can be made that it is also counterproductive in the long run, but that is a much less important matter. There are ever fewer places where the ways and means of science are safe from corrosion. Many of us treasure SI because it is—usually anyway—one of those places.

David P. Babcock
Boulder Creek, California

If the belief that there are different races within the human species is a fallacy, then the imposition of "racial" preferences, goals, or quotas in employment, college admissions, and government contracts is indefensible. But don't hold your breath waiting for this to be said by the politically correct contributors to Ashley Montagu's *Race and IQ*.

Anyone who wishes to evaluate accurately the nature-versus-nurture controversy would do well to examine what the hereditarians have actually said. The caricatures of their views that are invented by their enemies are not appropriate for that purpose.

David A. Shotwell
Alpine, Texas

One thing that seems to be lacking in books like *Race and IQ*, or perhaps only omitted from the review by Grant Rich, is the incoherence of moral and policy arguments derived from a "racial IQ difference."

First, even if it were true that a race (or even a family) of humans had a lower IQ "on average" than another, it does not follow that they are to be treated differently—our compassion, regard, and respect for our fellow man is not to be based on our estimations of his intelligence. So long as they are found competent and not mentally disabled, citizens are all granted equal rights in law regardless of IQ and there is no plausible argument for doing otherwise. Thus, racism could never find justification in such findings even if they were true.

Second, even if my family were found on *average to have low IQs, it does not follow* that I do as well. Hiring decisions, for example, could never even plausibly be based on averages—a sensible employer wants to know how smart his applicant is, not how smart his applicant's siblings are. It is certainly true that women "on average" have less upper body strength than men, but when could that ever be a rationale for refusing to hire any women for a job that requires heavy lifting? For there are surely very strong women who could outlift the average man, and it would be wise to hire them. It is thus the *individual* who matters—group stereotyping is rarely a useful method of assessing the abilities of an untested individual, and it is individuals that we personally deal with on a regular basis.

Third, even if a group had less intelligence on average than another, it does not follow that they won't benefit from better education and other environmental improvements—to the contrary, they almost certainly will, and even if the benefit were for some strange reason less than for other groups, a benefit is still the purpose of institutional policy. Thus, even on an institutional level such a finding could never justify racial bias in policy-making.

Fourth, IQ is not the only thing that matters. The racist breed of eugenicists face a serious conundrum when they observe that the finest athletes, and the people who tend to age far more gracefully, seem to be black. If this were proved true, it would behoove eugenicists to advocate interracial marriage, so as to generate the supposedly perfect blend of benefits.

Richard C. Carrier
New York, New York

Magnetic Hill Diagram

In the January/February 2000 issue (p. 17), the segment and illustration dealing with the magnetic hill purports to show that a car rolling backward over "a slightly downward incline" gains enough momentum to propel the car back up to the top of the hill. The perspective indicates that this explanation violates the Law of the Conservation of Momentum. A rolling body cannot rise higher than its starting elevation. Galileo proved this a few years ago.

There's no doubt in my mind that the magnetic hill is due to an optical illusion because there is a dirt road in a nearby canyon that presents the same misconception. It appears that one is going downhill at the bottom of a steep incline when one is actually going uphill. I found this out the first time I thought I'd coast down into the canyon on my bicycle from a high point and then found myself having to pump the pedals.

The misconception shown in the illustration could have been avoided by a smaller scale drawing with a longer and higher gradual rise from C to B so that B is at least as high as A.

Carl M. Wright
Boulder, Colorado

Joe Nickell replies:

Mr. Wright (along with several others who wrote on the same topic) is quite correct. While aware of the law of conservation of energy, I failed to realize its particular application in this case. If I had, I would have done as I routinely do when I'm out of my element: I would have consulted an expert.

Compounding the problem was the fact that the approach to Magnetic Hill ("A" in the illustration) is not clearly marked with a starting line but is instead an ill-defined area. I recall that my own car did not go all the way to the top, and I'm sure it did not rise higher than the point at which I placed it in neutral.

Fortunately, while I overstated the effect, *the* solution *to the Magnetic Hill enigma remains correct.*

The Evolution/Creation Debate

I am writing in regard to the news article "Science Trumps Creationism in New Mexico" (January/February 2000). I think that it is about time that evolution is taught in school. In the world today there is too much science to believe that God does everything. We cannot keep on hindering progress; religion has its place in the church while science has its place in the school.

I myself am a senior at Lakeview High School, and I am very glad that I was educated about the theory of evolution. I am a firm believer in the sciences. I believe that everything has a scientific explanation, and if we can't explain it then we will be able to in the future. Creationists believe what they believe because they can't explain anything so they use faith as an excuse and as a valid explanation.

Anthony J. Hentosh
Cortland, Ohio

It appears the evolution/creation debate is growing and will soon come to a school board near you. I wonder if I couldn't suggest a compromise that may allay some of the divisiveness this ludicrous debate so often engenders.

Mark Twain—no rookie in these kinds of discussions ("In the first place, God made the idiot. This was for practice. Then He made school boards")—in a magical, short piece about whether or not Admiral Cook actually made it to the North Pole, entitled, "Official Report to the I.I.A.S." (the mythical Indianapolis Institute of Applied Science), has given me an excellent idea how we might resolve this conflict. His character states, ". . . if it is a miracle, any sort of evidence will answer, but if it is a Fact, proof is necessary."

Why not allow the creationists the right to make the claim that through a "miracle" Earth was created in six days. Since there are no facts to back up the claim (nor, in this

context, any needed), this would take no more than a couple of sentences in the literature. The rest of the science texts could then be devoted to the thousands and thousands of interlocking, interrelated facts from geology, physics, cosmology, biology, chemistry, genetics, etc., that form the huge body of knowledge accumulated over the years that make up the "theory" of evolution.

This should satisfy the creationists, as they don't deny that, in spite of all the evidence to the contrary, it is truly miraculous that Earth is only ten thousand years old, and the evolutionists surely shouldn't whine about a couple of wanting sentences about the "miracle" thing.

Max M. Brown
Sarasota, Florida

Sense and Soul

I agree with Jeff Minerd's review (January/February 2000) of Ken Wilber's book *The Marriage of Sense and Soul* concerning Wilber's main thesis (Wilber's claim that subjective knowledge obtained in inner states can be accepted as "data" on a par with the empirical data of physical science). To be fair to Wilber, by such states I don't think he refers to visions or out-of-body experiences, but instead something more akin to Einstein's "cosmic religious feeling." But even if such states are reproducible, they are still subjective.

I think Wilber is right that science is value-neutral and needs to be supplemented with something that gives meaning to our lives. After stripping away supernatural beliefs and beliefs that contradict science, I think there remains a core wisdom to religion. This includes ethical teachings like the golden rule which have already been extracted by secular humanism. But religions have also developed a "secularizable" set of practices like compassion, mindfulness, and meditation that can help us achieve our ethical values. "Demystified" religion could then be a "science," but one more akin to, say, behavioral psychology than physics. I wish Wilber had emphasized this rather than "taking inner data."

There is other good stuff in his book. For example, Wilber seems definitely pro-science, and does a nice job debunking "postmodernist" philosophies like deconstructionism and romanticism.

Richard B. King
Morgan Hill, California

Night Sounds in the House

Notwithstanding Mr. Rothchild's ability to understand his self deception ("The Ghost in My House, An Exercise in Self-Deception," January/February 2000), I find his solution unsatisfying.

Mr. Rothchild suggests that when puzzled by inexplicable sounds in our house that instead of trying to understand them, we throw up our hands and say we don't care what they are. This may be wise from a mental health standpoint, but not from a problem-solving one.

Each groan, creak, and thump in our homes is caused by something. Many of these mysterious sounds occur only once or with such maddening infrequency that it's nearly impossible to locate or explain them. I suggest that if we had the time, patience, and money (in many cases), we could find a logical explanation for these sounds. And there's nothing wrong with saying "I don't know," in the meantime, which, to me, isn't the same as "I don't care."

So even though I don't know what causes the sounds, I am loath to admit I don't care. In my case, I blame the cat and dogs which roam our house at night; they make wonderful scapegoats.

Bill Young
Shelton, Washington

Palindromania

Frederick V. Malmstrom (Forum column, January/February 2000) would do well to study the works of the most (in)famous of Western singing groups, Riders in the Sky, whose mini-epic "Palindrome" tells of the hero of the old West whose only weapon was, well, you get the idea. You can find in this short and sordid tale more palindromes than you want or need. Two of my favorites:

When offered the opportunity to dally with a woman of easy virtue, he replies practically, "Sex at noon taxes."

And, more important, when given his choice between Italian food and deli for lunch: "Go hang a salami. I'm a lasagna hog."

When faced with these, Ada, Bob, Anna and Otto pale into insignificance (although some of these are mentioned too).

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Author's Query

For an article on the actual applications of "postmodernism" and "feminism" (either related or independent) to the criticism of "science" in an academic environment, the author seeks specific examples of first-hand experiences in university or college classrooms. These may be from the viewpoint of either student or instructor.

Please cite the name of the institution, the name of the course, the instructor of the course, the dates (if possible), the nature of the criticism invoked against "science" (either per se or a specific scientific field) and any other specific and relevant recollections or references (textbooks, etc.).

Please respond to:

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POB 502-SIPM
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Also please indicate if you wish to remain anonymous in citations. Thank you in advance for your help.

Ed Summer
New York, New York

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Astronomers, using the Wide Field Planetary Camera 2 on board NASA's Hubble Space Telescope in October and November 1997 and April 1999, imaged the Bubble Nebula (NGC 7635) with unprecedented clarity.

The remarkably spherical "Bubble" marks the boundary between an intense wind of particles from the star and the more quiescent interior of the nebula. The bubble surface actually marks the leading edge of the wind's gust front, which is slowing as it plows into the denser surrounding material.

To the right of the central star is a ridge of much denser gas. The lower left portion of this ridge is closest to the star and so is the brightest.

Located at the top of the picture are dense clumps of fingers of molecular gas which have not yet encountered the expanding shell.

Credits: NASA, Donald Walter (South Carolina State University), Paul Scowen and Brian Moore (Arizona State University)

THE COMMITTEE FOR THE SCIENTIFIC INVESTIGATION OF CLAIMS OF THE PARANORMAL

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The Committee for the Scientific Investigation of Claims of the Paranormal encourages the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view and disseminates factual information about the results of such inquiries to the scientific community, the media, and the public. It also promotes science and scientific inquiry, critical thinking, science education, and the use of reason in examining important issues. To carry out these objectives the Committee:

- Sponsors publications
- Conducts public outreach efforts
- Maintains an international network of people and groups interested in critically examining paranormal, fringe-science, and other claims, and in contributing to consumer education
- Encourages research by objective and impartial inquiry in areas where it is needed
- Convenes conferences and meetings
- Conducts educational programs at all age levels
- Does not reject claims on a priori grounds, antecedent to inquiry, but examines them objectively and carefully

The Committee is a nonprofit scientific and educational organization.
The SKEPTICAL INQUIRER
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